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PRESIDENT'S ADDRESS

SOUTHWESTERN SOCIETY OF ORTHODONTISTS

J. H. WEAVER, HOUSTON, TEXAS

THE Constitution as well as precedent has established the fact that when in general session the out-going president deliver an address to the members of this Society. This duty has been a pleasure as well as a task, a pleasure, because it affords me the opportunity to express my thanks and appreciation to you for the great honor you have bestowed upon me in electing me to guide the destinies of this Society during the past year. You have complimented me most highly, and I shall ever be grateful.

In the beginning may I say that in arranging one of these programs it is essential to have the cooperation of all of our members. I am happy to say that all who were asked, as always, accepted our challenge to work.

To the Program Committee, the Local Arrangements Committee, our very efficient Secretary, and all who have so gladly given of their energy and valuable time to make this splendid program possible, may I express my deepest appreciation.

Our hearts are saddened as we record the passing of two of our beloved members. One of these, Dr. Frank Harrison, was instantly killed in an automobile accident on June 18, 1938. At the time of his death he was serving in the office of president of this Society. Frank had served on almost all the committees in the Society and had held all the offices. He was always ready and willing to do his share, a loyal friend ever striving to uphold the high ideals of his profession. He was an active member of the State and National Dental Association, the American Association of Orthodontists, and a past-president of the Wichita Falls District Dental Society.

Read before the Nineteenth Annual Meeting of the Southwestern Society of Orthodontists, Feb. 18 to 21, 1940, Houston, Texas.

Our other loss was sustained in the passing of Dr. Oscar Busby on December 22, 1939. He was a most lovable character, a man who lived abundantly, loved his fellow members and the Southwestern Society for all that it means. Oscar was a past-president of this organization and a charter member. In 1938 he held the high office of vice-president of the American Association of Orthodontists, was vice-president of the World's Congress of Orthodontists, and an honorary member of the European Society of Orthodontists; was a past-president of the Dallas County Dental Society and an active worker of the State and National Dental Association. Such men as these cannot but bind us a bit closer together and it is the spark that has made this Society known as an unusually friendly Society, the like of which few enjoy. They make one proud of his profession and ever eager for the maintenance of its high purpose. We shall always revere their memory.

To our new members: we admonish you to remember your obligation as an orthodontist to your patient. Furthermore we urge you to live up to our ideal and promote among our membership a determination to be of service before any other consideration. This is part of your obligation to this Society. May you remember in your loyalty and adherence to this the worthy examples of those men who have passed on. You have entered a Society which was organized to help you as well as the older members. You are welcome here, and we earnestly want you to feel that we are your true friends. Attend the meetings regularly, never hesitate to ask questions, and to give us your ideas. This is your Society to run as you see fit. You will find the older men understanding and eager to help. There are no politics in this organization and let us ever keep it free of them. There may be times when a few members plan ahead for some key position, but let me assure you that they are only trying to be of service to you and to this Society.

As stated in our Constitution, the object of our Society shall be: to advance the science and art of Orthodontics, to encourage and sponsor research, to strive for higher standards of excellence in orthodontic instruction, to contribute its part in dental health service, and to promote fraternal relationship among its members. I hope that none of us ever entertains the thought that we have reached perfection in any of these objectives, because that would kill our enthusiasm and stay progress. As to this organization living up to the ideals set forth in these requirements and justifying its existence, there can be no doubt. I would here like to pay tribute to those founders of this Society who had such foresight as to recognize the great need of such an organization; we are deeply indebted to them, for it has only been since the organization of this group that orthodontics in this section has made any worth-while progress, and now it has been lifted to a standard equal to any in the world. We are only a few years old, yet we have a heritage rich in the tradition of being friendly, unusually hardy and progressive, achievements of which we are extremely proud and which we should zealously protect.

We are all vitally interested in orthodontics for the indigent and near indigent, but at the present time little is being done and little can be done in actual orthodontic treatment; because of the time element we are so limited

in the number of cases that we can afford to treat. As I see it, the only way to attack this problem is by preventive methods. Therefore, I would recommend that each of us give liberally of our time to educating the layman to its importance and urge the general dentist to practice more preventive orthodontics. Cooperate with your state, national, local dental societies, and children's dental societies in putting on preventive orthodontic programs. I would venture to say that the dentists of this state with the proper effort can do more enduring and permanent orthodontics by preventive means in one year than we could correct of the advanced type in our lifetime. This does not mean that this lessens the importance of our services. I cannot imagine anything that can give parents more happiness, and us, as orthodontists, more pleasure, and that is of greater importance to a child, than correcting those deformities of the teeth and jaws that can make him able to face the public with courage and confidence. Nothing we can say or do is going to keep an appalling number from neglecting this early service which can, in many cases, prevent a complicated procedure. Nevertheless, we should put forth our best effort for the furtherance of preventive orthodontics.

When the Board of Directors met in Dallas last summer, it was voted that the President appoint a committee to study the orthodontic educational problem and report to this meeting. Our task in the near future will be to preserve our educational standards and the integrity of professional independence by which alone the children of this country can be served efficiently. I quote from an editorial of Alfred P. Rogers[1]:

> "Change, of course, there must be as social conditions change. We must be ready to meet these changed conditions with intelligence and seasoned judgment. We must be strong in our protection of childhood from the inevitable result of lowered educational standards and dictation from sources that cannot in any possible way attain a sympathetic or adequate understanding of our field of endeavor."

Nothing would give me greater pleasure than to have our Society solve this problem. I believe that we have the key in our possession, as long as we have the approval of the dental profession, and I know that we do have that. The first and most logical way to approach this problem, as I see it, is for each and every member of this Society to live up to his obligation to strive in every possible way to make himself the best orthodontist that is within him and to apply always the golden rule when dealing with his patients and fellow orthodontists. This will strengthen our Society and make membership more desirable; therefore this will make it possible for us to demand a little better qualification of those who seek membership. In this way we can serve the public best as well as our profession. A short course does not make an orthodontist, neither does specializing alone, but to him who attends these meetings regularly and has the energy to work long and enthusiastically, will come his reward; he will wake one fine morning to find himself one of the leaders in his profession.

In the words of Alfred P. Rogers[2]:

> "We must develop among ourselves and instill into the minds of those who join us in future years, a philosophy which will insure the high standards which those of our friends, who no longer being with us, would wish to see developed, friends whose lives and whose endeavor helped chart the course that will, if continued, insure a triumphant future."

To those essayists and clinicians who have been so gracious in accepting our invitation to serve us, we are especially grateful. Most of them have come a long distance at a great sacrifice to their business. I speak of Dr. Barnett Sure, Brigadier-General Leigh C. Fairbank, Mr. Jules King, Dr. Willis H. Grinnell, Dr. Hays Nance, Dr. Archie Brusse, Dr. George H. Herbert, Dr. M. D. Levy, and Dr. Fred Elliott, as well as many of our own members. I speak the thoughts of all our members when I say we are honored to have you. The whole orthodontic group in Houston welcomes you and wants your stay with us to be happy and when you leave we hope you will say, "No regrets."

In conclusion may I quote this stanza from Kipling's *Jungle Book* in the hope that it may stimulate us to greater cooperation and loyalty:

> "Now this is the Law of the Jungle—as old and as true as the sky:
> And the wolf that shall keep it may prosper, but the wolf that shall break it must die.
> As the creeper that girdles the tree trunk, the law runneth forward and back—
> For the strength of the Pack is the wolf, and the strength of the wolf is the Pack."

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ORTHODONTICS—ITS PLACE IN MILITARY DENTISTRY

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REGARDLESS of our position, the rumblings and echoes of war today touch every nation. As individuals, we reflect upon the influences of war in the past and in what manner it affected us. As a profession, our concern centers upon dentistry's resources and expected contributions in event the menacing conflicts should involve our nation. Thanks to our national policy, the position of the United States in international affairs today is far more reassuring than at any similar period in all our history.

One reason for this strong position is because of a growing determination for an adequate national defense. While this brings a material increase in the strength and the development of every branch and arm of the Army, it also means the development of all the plans for the large army necessary in event of mobilization. The plans for a large and complex army for the defense of our nation require a proportionate increase in the medical department, making it capable of rendering adequate professional service in all branches of medicine. There must be plans for the procurement of medical personnel, of medical supplies and equipment, for the construction of hospitals and for the distribution of all the facilities to meet the demands for medical service. There must be training camps for medical department personnel. Thousands of doctors, representing all the specialties of these professions, must receive instruction in order to bring about their transition from civilian doctors to medical or dental officers. Careful training is required to fit these newly appointed men into their changed environment and into the assumption of new and strange professional activities.

Dental resources of men and material must be made an essential part of this medicomilitary organization. Whether all these agencies are to be mobilized in six years or in sixty years, there must be some definite plans so that dentistry may assume its place in the armies which may be called in defense of our nation. From plans set up today this dental service must be developed in a rapid, definite, and orderly manner. It must be a dental service representing the very finest of the American school for the maintenance of the oral health of millions of men, and for the restoration of dental function for many wounded soldiers. This plan calls for the expansion of our peacetime dental corps, a few hundred in number, to a wartime organization of many thousands.

Experiences gained in the last war clearly indicated the need for the development of special groups for the care and treatment of maxillofacial casualties, these groups to consist of oral and plastic surgeons, orthodontists, and prosthetists especially trained in surgical prosthesis. The achievements in maxillofacial surgery in the last war have stood as a great record, influencing

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the opportunities for military dentistry for the last twenty years. Orthodontics filled a great need in the situation of 1918 to 1920. Colonel Joseph D. Eby, one of our most prominent and greatly beloved specialists, accomplished so much and made orthodontics so useful in this new field that the Army has made every effort to develop his concept and make it an important part of our maxillofacial service. This new concept—facial orthopedics, as it were—brings about the movement of bone segments, not individual teeth, restoring original occlusion or original relation of the maxillary arches. As in the larger orthopedic problems in general bone surgery, orthodontics is important in many cases of loose fibrous union, those with small loss of osseous structure, etc. In many of these cases, after slow reduction, followed by fixation, spontaneous regeneration and union will take place. There are many maxillofacial conditions where orthodontic therapy will correct the malposition without surgical interference. The principles of anchorage, fixation, stabilization, intermaxillary force, and retention are better understood by the orthodontist in the restoration of function for these mutilated faces. Developments in orthodontics during the past twenty years provide newer methods to assure the desired results today. Not only has there been splendid advancement in orthodontic technique but also there has been a great advancement in our understanding of bone repair, so essential in these maxillofacial problems. Orthodontics is recognized today as one of the most important specialties in military dentistry.

Shortly after the World War several of our dental officers were selected for orthodontic training. It was felt that a number of officers should be trained, given years of experience, and encouraged to develop the concept of orthodontics as one of the supporting groups behind the maxillofacial surgeons. Through the years these officers have progressed in this special field. Continual training and rich experience have made it possible for a number of them to distinguish themselves in the field of orthodontics. The Army affords a field in which there is a great demand for orthodontic treatment—far greater than our few specialists could ever satisfy. Occasional demands for orthodontic interference in problems of restorative dentistry, many cases of maxillary fractures, and the treatment of malocclusion for military personnel or the children of officers and soldiers, have given each of them many years of valuable experience. The solution of many individual problems of Army boys seeking admission to the United States Military Academy has resulted from the efforts of our Army orthodontists. Furthermore, with an experienced orthodontist stationed at West Point it has been possible to continue orthodontic treatment for many cadets who have been under the care of civilian orthodontists prior to their entrance into the Academy. We have recognized the fact that only through long experience and adequate training could we form a nucleus around which could be built the larger group necessary in time of war.

The usual application of orthodontic therapy is to correct growth deficiencies and establish an acceptable occlusion of the teeth. The wartime need for orthodontic specialists can be met by bringing into the dental service a group of experienced men who can apply these same methods and principles in the restoration of the bony structures. The rebuilding of the bony framework is a big

problem in the movement of bone segments en masse. Furthermore, in all the fields of medicine and dentistry, no group can be found which has studied maxillary bone growth and repair, comparable to the orthodontists. Orthopedic principles, the mechanics and apparatus for general bone repair, do not have the exactness and precision equal to that extreme delicacy which the orthodontic measures provide. We have in the orthodontic specialty every essential for the development of an important and highly skilled group to meet the problems of dental orthopedics in the maxillofacial hospitals in time of war.

Let us visualize these problems of war. Missiles produce devastating wounds of the face. There are many complicating elements associated with gunshot wounds—structures involved, direction of the foreign body in the tissues, and the broken teeth, clothing, et cetera, scattered through the wounds. Accompanying jaw wounds there are often other serious injuries which require early attention, and frequently, weeks of skillful care. Often, without the necessary attention, the fragments of maxillary bones collapse, under these conditions, and bony union or repair takes place with these parts in malposition. Function is lost, or the bony structures do not present a satisfactory framework upon which to rebuild and repair the soft tissues of the face. How to bring these mutilated structures into their proper relation without resorting to surgery is the task of the military orthodontist. A majority of these cases will require surgical interference, but here again the orthodontist can serve the oral surgeon splendidly, for the designing of splints and heavy appliances is the particular duty of the orthodontist. Again, it may be necessary to assist in the final correction so that an efficient prosthetic replacement may be made to function properly. The whole consideration of treatment planning involves the oral and plastic surgeons, the orthodontists, and the prosthetists. There must be a unity among these groups and a determination to pool all their knowledge and skill to the end that a more beneficial service may be rendered. Gunshot wounds of the face and jaws require serious study for effective plans for treatment. It is particularly important for the orthodontist to have an accurate understanding of the whole problem. In fact, the structures involved and the complications encountered include so many surgical fields that this entire problem must be explored with the very greatest care by many groups of specialists in the development of sound methods of treatment. Injuries to the superior maxilla frequently involve the nose and eyes as well as the teeth. Gunshot wounds of the jaws often extend to the throat or ear structures. Nerve tissue is usually injured, sinuses affected, or serious brain and head conditions may complicate the difficulties. Deep burrowing infections may extend into the structures of the neck and chest. All these complications demand the skillful efforts of surgeons who are trained in these special branches which are closely related to the dental field. Every dental surgeon working for these patients must have a definite understanding of the whole series of problems in this field and be able to discuss and assist in the care of these patients in an intelligent manner.

For a more satisfactory approach to the general problems of gunshot wounds of the face and jaws, it might be helpful to consider their treatment under four distinct phases or stages.

I. EMERGENCY STAGE

Emergency care includes all the early treatment of jaw wound or injury. Medical personnel are responsible for first aid treatment and emergency care in the combat zone or the place where injury occurs. This early treatment includes the control of hemorrhage, clearing of the air passage to maintain respiration, application of the dressing and immobilization of the fragments, and finally, the safe transportation of the patient to a hospital. In passing from one aid station or clearing station to field hospital or other intermediate medical installation, further attention will be given, such as treatment for shock, administration of antitetanus serum, cleansing of wounds, and the careful adjustment of simple splints to conserve bony structures, to restore original occlusion, and to prevent collapse of fragments. In the various steps or stages through which the patient passes before reaching a fixed hospital, dental surgeons have given attention to the needs of these cases. It may have been necessary to ligate a blood vessel, to clean up the wounds or to stabilize the fragments, or to adjust a new dressing. This calls for trained dental officers for emergency treatment.

II. SEPTIC STAGE

In a majority of gunshot wounds of the jaws, one may expect serious infection. Upon the removal of a dressing after forty-eight hours, one will find free flowing pus, necrotic tissue, and many serious and dangerous complications. Frequently, extension of infection and necrotic areas results in severe hemorrhage and death. In a surprising number of cases in British hospitals, tracheotomy was resorted to, to maintain respiration, because of inflammation and swelling, due to rapid spreading of infection into the tissues of the neck. It is but the beginning of the septic phase through which these jaw cases usually pass. Weeks of treatment are required for the cleaning up of infection and for the period necessary for the healing and seasoning so essential prior to the final surgical operations. During this period, one of the most important factors is immobilization of the bone segments. After the removal of foreign bodies, debris, fractured bone and tooth particles, et cetera, except in cases where sequestration follows later, fixation of loose segments has proved to be of prime importance in the early control of infection.

III. RECONSTRUCTION STAGE

Past experience has clearly shown that the various steps of reconstruction—the oral and plastic surgery—must not be undertaken until the infections of bone and soft tissues have been entirely cleared up. The rebuilding of the bony framework of the face and jaws and the plastic surgery of the soft tissues are accomplished during this period. In the first World War, this stage of treatment for our soldiers was accomplished in our hospitals at home. It is necessary to move the patients to other hospitals for this surgery—entirely away from the septic wards and surgeries where the very air seems to be infected. Surgery in the old military hospitals a century ago usually meant death, for sepsis was universal. (Today, we provide for clean surgery, and in our military hospitals, we know how to secure it.) Dental surgeons and orthodontists are

required in the reconstruction stage. We must provide all the facilities to assure the preservation of dental structures and to maintain original occlusion or functional relation of the jaws for the final restorative work.

IV. RESTORATIVE STAGE

This is the stage for the restoration of dental function, the construction and insertion of replacements for lost dental structures and lost ears, noses, or other facial parts. The dental service is concerned with major problems in this stage.

Through these four stages, it is necessary that sound application of orthodontic principles of fixation, traction, and retention be maintained. It may be for the control of fragments. It may be for slow reduction in the early stage, or for gradual reduction and control in the reconstruction stage, or later in the restorative stage for some essential readjustment. The whole consideration of maxillofacial surgery is a blending of orthodontic and surgical principles and their careful application to assure the restoration of function and the final construction of useful and comfortable dental replacements.

The common principles and methods of orthodontics are applied in new ways. The dental officers in the combat zone are trained to apply emergency treatment, including simple orthodontic principles. Fixation is tremendously important. Traction is essential and far more powerful than used in tooth movement. In the fixed hospitals, traction and retention, spring force and anchorage become of major importance. Splint and appliance construction is simple, but sturdy and heavy. Plain orthodontic bands are seldom suitable for anchorage, and heavier appliances are designed for control. The movement or control of segments of bone and the counter-resistance or reciprocal forces demanded tax the ingenuity of the orthodontists in the application of these common principles in an entirely different manner than known in usual orthodontic therapy.

In 1936 a rather comprehensive presentation of orthodontics in the field of maxillofacial surgery brought an accurate picture of the orthodontist's place in the care of these cases.[1] Interesting changes have developed during the last four years—changes which make procedures more certain and results more gratifying. There are other problems requiring careful study, and it is hoped the cooperation of the orthodontists of the country will make possible the progress and complete development of orthodontics in this special field.

Plans for an expanded medical department in time of mobilization provide for the training of many special groups. This includes the large dental corps and its subdivision of specialists required for all types of dental service. Advanced instruction and careful training will be provided for oral and plastic surgeons, orthodontists, prosthetists, and others needed in the maxillofacial service. This training will originate in the general hospital training centers and extend to certain selected civil medical centers where every phase of training will be coordinated and developed with related medical services to assure an efficient maxillofacial service.

Upon the completion of their training, orthodontists will be assigned to general hospitals, along with other specialists, where jaw cases will be received

for treatment. Some of these hospitals may treat these cases only during the septic stage. The training of these orthodontists will cover this phase particularly. Others will be assigned to the jaw hospitals where the reconstruction surgery is done. Their training must embody all the types and special care demanded during this stage of treatment. Another group will be associated with the dental service responsible for the restorative dental measures. In each of these hospitals one will find the usual dental service, but the large maxillofacial units make up a new and elaborate service required during war. Maxillofacial surgical teams are assigned as auxiliary units in the surgical and evacuation hospitals of the combat zone, but are also an essential part of the surgical unit in the jaw hospitals. Supporting the surgical teams in the general hospitals will be the orthodontists, the prosthetists, and restorative specialists. Working with them will be the roentgenologists, photographers, artists, moulage experts, wax workers, and laboratory technicians. Every phase of treatment will be carried out by highly trained men. The necessary facilities will be at hand to record the complete history of every case for the historical section of the medical department.

Planning a complete medical department for an army of 4,000,000 men calls for a large number of dental officers, each of whom must have adequate training. Especially must we provide the training necessary to give them a true concept of the military dentistry. The dental surgeon from civil life finds military dentistry differs but little from corrective measures in civil practice. Some routine problems, however, are beyond the scope of the average dental practice. But few men in civil practice have much experience in the treatment of maxillary fractures. Seldom does an orthodontist assist in the care of such cases. Rarely does the prosthetist have to plan restorative work requiring the replacement of large portions of lost bone. The dental oral surgeon seldom experiences many hours in a surgery; rarely does one work day after day with plastic surgeons. These are some of the big problems of military dentistry which we must be prepared to meet in time of war.

An interesting fact is disclosed in the peacetime consideration of the treatment of jaw injuries in time of war. Our mission for military medicine and dentistry is to maintain the health of our Army and to heal the wounds of war. It is not a destructive power but a restorative force. The advances made in military medicine in time of war have always contributed to better methods useful in the period of peace which followed. At this very time, when we are making plans for the training of personnel effective in time of mobilization, our attention has been called to the great need for a new and stimulating professional force to develop sound methods in the surgical and dental care of jaw injuries during peace. Modern life with its transportation, industrial, and sports accidents requires a new effort in surgery to provide the necessary dental and surgical care of jaw injuries. We find a growing interest in our work which will be useful in civil hospitals. There are distinguished oral and plastic surgeons urging us to explore this whole field and develop a sound concept for specialists in this field. These men have expressed a desire to work with us to the end that a more satisfactory development of oral and plastic surgery will appear to meet the widespread needs of our time.

I like to visualize our efforts in these days as being useful in a great era of peace. While our responsibility is to develop and provide the medical agencies for our nation in time of war, you may be sure it is stimulating to know that it is equally essential to provide a modern and comprehensive service of this kind for the nation during the period of great industrial and commercial activities of peace.

Nothing short of the finest dental service for our Army will satisfy the dentists of this nation. The nation expects the dental profession to furnish capable men to augment our small dental corps in the time of mobilization and expansion. You want to know that every provision is made for the development and training of the thousands of dental officers as military dentists. You are particularly anxious that the advances in orthodontics become helpful in the field of military dentistry. Devotion to our profession and love for our country stimulate us in our determination to satisfy this need for orthodontics as an important factor in military dentistry.

There is a great responsibility placed upon our specialty in this new field. It means work, thoughtful study, and careful experiment. The achievements of dentistry in the past are an inspiration today. But opportunities for service in time of national need constitute an even greater incentive for determined effort. Dentistry's strong position today demands the unselfish and earnest effort of the entire profession so that we justify the support of medicine, maintain a place among the distinguished medical groups, and provide the highest type of dental service to meet the needs of our time. In peace and war, orthodontics is important to our people and to our nation. With your guidance and encouragement, we will place orthodontics in its important place in military dentistry.

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ORTHODONTICS AS A SUPPLEMENT TO ALL RESTORATIVE DENTISTRY

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IN THE last two decades we have seen the dental profession grow, expand, and improve enormously. At the present time, the more progressive dentists agree our profession as a whole is almost too intricate to be dealt with successfully by any one person, if the highest grade of results which we know how to achieve are to be obtained. Specialization is necessary, and if we dentists specialize, we must also learn to cooperate with each other. It is the purpose of this paper, to present briefly the cooperation of orthodontics with other branches of restorative dentistry.

Orthodontics is a practical measure. It is not mysterious or perplexing. It is not complex in its application. It is definitely scientific in principle. It is not so new as to be highly problematical, but is based on proved practice. To indicate it is reasonable in a great many dental cases. It helps other good dentistry to be even better. Why, then, is it not utilized more by those who are desirous of making progress in our great profession? A recognition of what orthodontics can do, supplementing other dentistry, to bring about the betterment of the life, health, and happiness of our fellowmen who need dental care is essential to the full professional success of every dentist.

Orthodontics began and has grown largely out of the observation and experience of general dental practitioners. Yet many of these, it now seems, are like parents who, having given birth to a child, are inclined to desert it. Are those who have this attitude serving well themselves and the advancement of dentistry? In this brief paper we attempt to show that neither the orthodontist nor the general or other specialized dentist can get along happily without the other.

Functional restorative dentistry, in all its aspects, is advancing amazingly. Let no one of us think that his portion of the profession will continue to go forward if he neglects to utilize the other portions. And orthodontics has a partnership to offer to almost every alert dentist.

Years ago it was observed that teeth would move. The condition itself and influences producing it were noted and were studied by general practitioners. Teeth drifted or tipped after an adjoining extraction. A tooth elongated after its antagonist was removed. What to do when conditions like this existed was long a problem in general dentistry. Then came a step in advance. Dentists reasoned that if teeth would move without mechanical appliances when movement was not desired, surely they could be made to move with the help of these when movement was definitely desired. Thereafter came specialization.

Read before the American Academy of Restorative Dentistry, Milwaukee, Wis., July, 1939.

Today we define orthodontics as that branch of dentistry which, by definite, complete control of the movement of teeth, corrects or prevents oral anomalies and independently or supplementing other restorative dentistry, insures harmony in the dental arches, so that injuries are mended, the dental mechanism will function in a normal way, and the psychologic and esthetic qualities satisfying to a patient will be secured. Orthodontics, in its efforts to realize the fullness of the possibilities of the great field thus defined, has become an exacting specialty. But in perhaps its most important aspects, restoration after injury, it is not separate, but is inextricably allied with other branches of restorative dentistry.

Orthodontics, like every other branch of good dentistry, is a study based on the growth and development of all the dental structures. Like the other aspects of dentistry, it aims at the realization of proper anatomic and functional relationships in the whole dental mechanism. It goes also, as they do, beyond problems of teeth alone and deals with biologic, esthetic, and psychologic problems which are solved only in part by treatment of the teeth and, in the dental field, only in part by the use of mechanical appliances. Within dentistry itself, occlusion of teeth, with which orthodontics perhaps chiefly deals, is involved in every dental trouble and confronts every dentist in every service he renders.

Many diseases, deficiencies, and disorders of the oral cavity seem to be directly related to functional disarrangement in other parts of the body. There is a large group of systemic diseases which manifest themselves in the mouth and seriously affect the diagnosis, the prognosis, and the practice of the dentist. Dental health is tied up with all health and with much of human happiness and efficiency. We must not think of ourselves as working only within narrow boundaries.

When America most needed human efficiency, what happened? During the late World War more than 50 per cent of the flower of young manhood, from eighteen to thirty years of age, when drafted into the American army, had such defective teeth that the minimum dental entrance requirements twice had to be reduced, in order to admit the man power urgently needed in a great national crisis. Yet each reduction indicated a decrease of human and military efficiency. More than one-fifth of these American boys were rejected on account of their mouth condition. Nor are national dental conditions satisfactory now. A creditable survey of adult health conditions, made within the last few years, reports, in conservative language: "A considerable amount of extensive dental repair work is in evidence in the mouth of adults. Apparently the greater portion of this work has been well done, but a considerable part of it seems imperfect and unsatisfactory."

The professions in the vanguard of the healing arts are waking up. They have a tremendous responsibility for the general health of the public. They are coming to realize this. Dentistry has a part in the awakening. General nationwide concern for the public health is supplementing private medical practice in demanding more and better dentistry. A complete and satisfactory general health service is possible only when functional restorative dentistry, in all its aspects, is brought into a unified endeavor. It is possible

only when biologic , esthetic, and psychologic features of health and happiness are fully coordinated with mechanical and semimechanical aspects of the curative processes used. All builders of health, including dentists, must stop thinking of themselves in terms of the techniques of their practice, and must learn to see the larger horizons, within which all health-giving agencies work happily and cooperatively together.

In dentistry this obligation to a large cooperation can be successfully consummated only by those of us who are fully prepared for it by education, by experience, by inclination, and by understanding fully what it is all about. As fast as we can, we must move our whole profession toward this goal. In the meantime we must live patiently and happily with our colleagues who cannot or will not look at the larger meanings of what we do. When viewed in the broadest light, the planning, constructing, and fitting of dental restorations is seen to be one of the most necessary health services in the healing arts.

Let us look backward over history. At the beginning of dentistry, our profession was a means for the removal of injured teeth, the retention of loose teeth, and later, the artificial replacement of lost teeth. It was practiced in order to overcome pain, disability and, no doubt later, disfigurement. In its slow evolution, dentistry came to give more consideration to esthetic and functional phases of dental restorations. Many centuries passed, however, before any attempt was made to correct irregularities in the position of the teeth. And until the advent of the roentgenograph, a little more than a quarter of a century ago, health service in dentistry continued to be so uncertainly established and so problematical that it was only of secondary interest. A few diseased teeth were removed; but many more were treated and retained too long, constituting a dangerous hazard to general health. It is said that President Theodore Roosevelt, recent as he was, and strikingly virile as a man, died as a result of such a condition. Specialization, the recent findings in chemistry, biology, physiologic diets, balanced glandular functions, and the means of really making prevention come to pass in dental health are recent indeed and are not yet altogether understood or appreciated by the profession. But dentistry is moving on. In such a time as this, none of us can afford to be asleep.

There is evidence that a new day is dawning. Leaders of the dental profession are seeing further than ever before. They are realizing that the ideal of preventive dentistry is greater than the ideal of restoring after damage has been done. They see that such dentistry requires much attention to the supervision of dental development, including the prevention of malocclusion. Orthodontics is in the vanguard of this new advance. Even a study of speech suggests the importance of the proper alignment of teeth as a factor in mastering man's greatest tool, the art of communication. Psychiatrists are showing the result of pronounced physical defects on one's personality, as well as on social contacts and economic efficiency. And, strictly within our field, it is generally agreed that malocclusion of the teeth contributes to the development of caries, may be an important factor in periodontal lesions, and may be involved in every service that the restorative dentist presumes to perform.

We must agree that, specifically, the main objective of dentistry is the restoration and maintenance of normal occlusion. This is true of every phase of our profession except exodontia, which deals with a radical operation coming, of necessity, after the opportunity to prevent it has been lost. Normal occlusion implies that all the teeth in one jaw occlude with the teeth in the opposing jaw, so as to furnish the largest area of balanced or functional grinding surface. This goal is not the property of a specialized field. The average dentist needs to check and record the conditions found when the teeth are occluded quite as well as to inspect clinically the five surfaces of every tooth. Many a diagnosis and prognosis will be changed if the dentist who makes it will think as fully of the jaws closed as of the jaws open and if he will think also of the jaws and teeth at work. If well-made models, correctly occluded, are studied in connection with clinical findings, if the patient's history and full mouth roentgenographs are fully considered, dentistry then comes to be a profession that sees at least its specific problem as a whole. And the problem can nearly always be seen as one of occlusion.

If a tooth is missing, orthodontic assistance can often be utilized to great advantage prior to supplying the missing teeth. A difficult case may often be changed into one more simple for bridge replacement. When dentists speak of orthodontic assistance, altogether too many of them are prone still to think of only the child patient. Experience has taught us, however, that a considerable improvement can be made for older individuals, at least for those not beyond their thirties. Modern dentistry, in truth, is coming to see a vast number of indications for orthodontics in the everyday practice of general restorative work with adult patients. Single teeth or groups of teeth may be moved into position more favorable for fitting replacements. Widely separated anteriors may be closed for both esthetic and periodontal improvement. Individual teeth in labio-, linguo-, or torsoversion may be correctly positioned. In cases of fractured teeth or jaws, orthodontics makes an undeniable contribution. Impacted and semi-impacted teeth which are imperatively needed can be brought into the dental arches. The horrors of the open-bite and the grief of the close-bite can also be considerably improved by orthodontics. Space maintenance can best be physiologically controlled by judicious guidance by means of orthodontic appliances.

We were thinking a few moments ago, of the dental requirements made in World War times. It may be information to some to note the present Army and Navy requirements for young officers. No candidate for admission to West Point, to Annapolis, or to the Coast Guard School can be accepted unless the following requirements are met. They are quoted from paragraph 1460-S of the regulations. They recognize very fully the relationship of good dental conditions to general health and efficiency and to military desirability:

(a) Every candidate shall be examined by a naval dental officer, who shall make a separate report in each case of his findings and recommendations to the president of the board of medical examiners.

(b) The dental standards governing appointment to the Naval Academy are the same as for commission. The oral soft tissues must be in a state of health, and all dental restorations and replacements of the highest order. Wide edentulous spaces, resulting in inefficient masticatory surface shall cause rejection. Prosthetic re-

placements are not considered serviceable unless supplying missing teeth in excess of the 20 vital serviceable teeth as specified. Unerupted teeth are not included in the 20 vital teeth required. All required dental treatment, restorations and replacements must be obtained by the candidate prior to entrance to the service schools.

The teeth shall be thoroughly examined. No candidate shall be accepted unless he has at least 20 vital serviceable teeth, and of these not less than 4 opposed incisors, of which 2 are directly opposed on each side of the median line, and 4 opposed molars, of which 2 are directly opposed on either side of the dental arch. Teeth properly filled or which have been properly restored by crowns may be considered serviceable teeth.

Causes of rejection:

(a) The loss of teeth in excess of the standards noted in paragraphs 1458 and 1460.
(b) Marked pyorrhea alveolaris.
(c) Marked protrusion or retrusion of either jaw, or any abnormal condition causing malocclusion.
(d) Extensive restorations by crowns, bridges, or dentures, or teeth generally unserviceable.
(e) Edentulous spaces in the dental arch, causing wide separation of the continuity of the masticating surfaces, will cause rejections.
(f) Nonvital infected teeth, defective root canal fillings or unfilled canals.
(g) Malignant tumors of alveolar process or benign tumors or cysts which may tend to enlarge.
(h) Syphilitic lesions of the oral membrane.

The above statements are eloquent. Let us return now to general practice and think, for a moment, of ill-considered destruction of teeth. Sometimes a dentist, intending to help a patient, has unthinkingly extracted canines. This course often leads to wretched mutilation instead of to the at least temporary improvement hoped for. To extract any permanent tooth for esthetic or functional purposes is unwise until after the whole mouth has been studied. And in such study, the advice and counsel of a well-informed orthodontist may prove of inestimable value both to dentist and to patient. Congenitally missing teeth, as well as supernumerary teeth, present a mutual problem to orthodontists and other dental groups. No deciduous tooth should be removed until such destruction is necessary; then a roentgenograph should first assure the dentist that a succeeding permanent tooth is present.

Dentistry seeks to make, in some golden age of the future, dentistry unnecessary. Every professional man works toward eliminating someday the causes for his services. This is the philosophy of preventive medicine. There are few human achievements that are more striking than those that have resulted from the increase of knowledge of disease and of methods of control and prevention. This comes into our own profession. Defective teeth and infected gums are leaders in bringing about the diseases which affect and plague human beings. The preventive treatment of diseases of the hard tissues of the teeth and of deficiencies in the teeth is one of the leading responsibilities of the future of our profession. The public has every right to expect us to grow into a grade of dental service that we now can hardly dream of. May we go forward with vision, unselfish courage, and sincere enthusiasm.

RELATIONSHIP OF ORTHODONTICS TO PEDIATRICS

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THE relationship of orthodontics to pediatrics embraces the whole field of children's medicine. Most of the factors of heredity, endocrine imbalance, metabolic disturbances, nutrition, growth, and prenatal abnormalities in relation to orthodontics are not fully understood. Pediatricians argue with pediatricians. Pediatricians argue with orthodontists. I am even told that orthodontists have some differences of opinion among themselves as to these factors. Recent experimental work and clinical observations suggest that this may not always be so, and I would like to spend most of the few minutes allotted to me to emphasize the fields in which most progress is being made.

For the sake of clarity, let us divide the subject in four parts. First, malocclusion in relation to heredity and prenatal influence. Second, sucking and other habits in infancy. Third, nutrition. Fourth, metabolic disturbances in infancy and early childhood.

It is important that we clearly distinguish between heredity and prenatal factors. Hereditary causes of malocclusion depend on the fact that physical characteristics in man, including those of the jaws and the teeth, can be inherited in a simple Mendelian manner. It has been shown that hereditary tendencies occur in the size and shape of the jaws, from actual measurements, in a large number of families. A picturesque, but unscientific example may be found in the royal Hapsburg family. The heavy protruding undershot jaw is found throughout the whole family from Catherine of Aragon, the first wife of that old roué Henry VIII, to Alphonse who a few years ago lost his job as King of Spain. In many cases the type of mandible is inherited from the father and the maxilla from the mother and vice versa. This causative factor is beyond our control without the application of the principles of eugenics.

Prenatally, the diet of the mother, her freedom from infection, and the balance of the glands of internal secretion during the time of pregnancy undoubtedly have a definite effect upon the normal growth of the fetus. The general well-being of the mother during her whole pregnancy is receiving more and more consideration by the men doing obstetrics. Attention to a complete diet, including the essential vitamins and an adequate calcium intake, guarding from infection, and the administration of indicated glandular therapy have become as much a part of obstetrics as the actual delivery of the child. In the future, this must have its effect upon a more normal growth of the infant skeleton, including the bones of the jaw and the muscles controlling stress and strain applied to the developing teeth.

A few words concerning sucking and other habits in infants and children. Several years ago pediatricians dogmatically put restraints of various kinds on every child who sucked his thumb or fingers. Then the pendulum swung in

Read before the Central Section of the Pacific Coast Society of Orthodontists.

the opposite direction to the point where no mechanical attempts were made to stop sucking habits. As in most things medical, we have now reached a middle ground. The following ideas presented by Dr. Noyes at the meeting of the American Academy of Pediatrics in Cincinnati a month ago are entirely in accord with ours. First, certain children can go on with sucking habits for several years and, due to good muscular balance and lip function, return to normal occlusion. Second, others can suck fingers for only a short period of time and not return to normal occlusion without mechanical aids. Third, another group of children will return to normal only if restrained early. Fourth, due to this latter group, restraints of some type are justified during the first two years. Fifth, restraints should probably not be used after the second year, but if possible the habit should be approached from a psychologic standpoint. Whenever restraints are used, it is important that they be used effectively or not at all. They should be kept on for twenty-four hours a day, not twenty-three hours and fifty-five minutes.

The method now in vogue, of placing young infants on the abdomen, which certainly makes many of them comfortable, has been widely discussed. That it may lead to a retrusion of the mandibular dental arch has been argued pro and con. Personally, I feel that if this practice is kept up only during the first few weeks of life, it is harmless.

More important in the production of malocclusion, is the present tendency for more babies to be weaned early. Particularly is this danger increased by the use of a long, bulbous, rubber nipple. So little pressure is necessary to make the milk flow from such a nipple that the suckling infant fails to properly develop the facial muscles so necessary for good dental alignment. When an infant nurses at the breast, due to the fact that the mother's nipple is short, the child is forced to reach out with the lower jaw in order to make sufficient pressure to get its food. No doubt many of you are familiar with the nipple designed by one of your confreres, Doctor C. O. Edwards, for the Andy Gump type of infant. The flange at the top forces the baby to reach out its mandible in order to get its food.

While it is impossible to classify the type of malocclusions due to nutritional deficiencies, it is well established that poor nutritional states, not only lead to orthodontic deformities, but, also, corrective procedures fail because of a poor nutritional state. Eighty cases examined for orthodontics at the University of California Hospital show that from a nutritional viewpoint 3.5 per cent were very poor risks, 23.5 per cent were poor, 51.25 per cent were fair, and only 21.25 per cent were good risks. It is unnecessary here to go into the foods which make up an adequate diet. Minimum requirements for daily food intake can be found in any standard work on nutrition. There are, however, two points which I would like to emphasize.

In the first place there seems to be a current idea that the only thing necessary for good bony development is to provide the growing individual with an adequate amount of calcium. From the dosage given to many children one would think that, if a little is good, more is better. In reality, an excess of calcium tends to prevent calcification by causing a precipitation of tri-calcium phosphate in the gastrointestinal tract rather than in the cartilage and bone.

Vitamins C and D and phosphorus, plus calcium, are needed for the production of normal bone, not calcium alone, and certainly, not calcium in excessive amounts.

In the second place, it has been shown that a marked deficiency in vitamin C suppresses the formation of new bony trabeculae, and, wherever bone is already formed, resorption occurs. These changes affect the structure of the bone morphologically and from a functional point of view diminish its capacity to withstand mechanical stress. Marked vitamin C deficiency, persisting for long intervals is rare. But does it not seem probable, then, that a moderate vitamin C deficiency may play a part in certain orthodontic failures? I am led to believe that such does occur.

A poor basic state of nutrition from any cause must at times make impossible a normal occlusion. If this is true, it must follow that a complete physical examination and a careful check of the diet as a whole and the vitamin intake in particular, should precede any orthodontic work. There is little doubt that, from a nutritional standpoint, a given child may or may not be a good orthodontic risk. If the nutritional factor is removed before orthodontics is instituted, at least one variable factor leading to failure can be eliminated.

The presence or absence of allergy may not only determine the success or failure of orthodontics, but in addition, is one of the most common causes of dental malocclusion. What is allergy? Briefly, it may be defined as an unusual reaction by certain individuals to various substances. This is not due to anything poisonous in the substances themselves, but to a disturbance in the body cells of the allergic individual. That old wheeze, "What is one man's food is another man's poison," cryptically describes the allergic response.

Some individuals develop allergic manifestations such as colic, pylorospasm and eczema early in infancy. Other children, fundamentally just as allergic, give no evident signs of allergy until they develop asthma or hay fever during adolescence or later. In both instances, however, there is often an interference with growth which may lead to orthodontic deformities. It is of paramount importance to recognize the allergic state in both groups.

According to the late Wingate Todd and Milton Cohen of Cleveland, "Nature has arranged a coordinated schedule of growth for the human body. Various parts grow at different rates at different times. If growth is inhibited or its rate diminished at a time when some important area, such as the face, should be growing rapidly, the loss may never be made up, since nature must pass on to the next part of her schedule at the preordained time. It is in this manner that allergy produces orthodontic deformities, especially during the first year and between the third and sixth years of life."

Fortunately, it is possible to diagnose the allergic state in children who do not present any evident allergic manifestations. You have all seen children come into your office with the following physical make-up:

"1. A thin child, short for his age and light for his height.
2. Skin dry.
3. Fair to poor muscle tone.
4. Flat narrow face.
5. Turbinate congestion in the nose.

6. Some orthodontic deformity.
7. High, arched, and narrow palate.
8. Whiny, irritable and erratic in his behavior.
9. Unable to center his attention, except for a short time."—Milton Cohen.

Add to this a granulation of the outer third of the lower eyelid, which is one of the earliest allergic signs, a family history of allergy and feeding difficulties as an infant, and the presence of an increased number of eosinophiles in his blood count, and the diagnosis of allergy is clear cut. Not only can these children be diagnosed, but in the majority of instances can be effectively treated. Proper control of children with allergy is followed by improvement in mineral utilization and rapid increase in height, weight, and maturity indices. We can no longer look upon the allergic child simply as one who wheezes and sneezes. He is an individual whose growth is curtailed. From your standpoint, he is a child whose facial and jaw development is unable to maintain a normal growth pattern.

The percentage of allergic individuals has increased. Consequently, more and more children will present themselves to the orthodontist for correction of malocclusions due to allergy. It is my belief that we, as pediatricians, are responsible to some extent for this increase. In our efforts to insure rapid growth during the first two years of life, I am convinced we are overfeeding many infants. We offer too much and too wide a variety of foods, particularly during the first year. Comparing our own office records of today and fifteen years ago, we find that formulas now in use have an increased caloric value of from 25 to 50 per cent. I believe a certain amount of this food excess now offered is not completely digested and the incompletely broken down protein molecule sensitizes many of these infants. As a consequence they develop allergic manifestations. In the long run we defeat our original purpose because, as we have seen, growth is interfered with when a child is passing through an allergic phase. (I simply could not resist dragging in this pet theory of mine.)

Not only is allergy increasing. The same may be said for problems in endocrinology. Perhaps our attempt to push growth to its maximum rate has had something to do with the imbalance in the glands of internal secretion. Be that as it may, abnormal growth present in many endocrine disorders leads to certain orthodontic problems.

Many cases of pituitarism have a separation of the frontal maxillary and mandibular teeth. In anterior lobe insufficiency, besides the unusual spacing of the front deciduous set, the teeth are usually small when the insufficiency occurs early in life, and large with increased density, when it occurs late in life. In primary hypogonadism there is either overcrowding or separation and the teeth as a whole are much larger than in the average person. The maxillary central incisors are usually large compared with the adjacent lateral incisors. In secondary hypogonadism the features are infantile with a decreased development of the maxilla, tending to an anterior angulation of the face with a recession of the mandible.

It is in subthyroidism, however, that we find the most common cause of orthodontic deformities due to glandular imbalance. Thyroid deficiency in

infancy causes late eruption of the deciduous teeth. Not uncommonly even without treatment, this deficiency is corrected by the time the permanent set is due to erupt. But the deciduous teeth, having appeared late, are not lost early enough to permit the normal development of the buds of the permanent teeth. Crowding and irregularity of the permanent teeth naturally result. When the thyroid deficiency persists through childhood, many orthodontic deformities, the large majority of which are not clearly understood, are to be found. Recently I had two patients with close-bite, both of whom were deficient in thyroid. The one child had a basal metabolic rate of –15; the other had a delayed bone age of three years.

Not all delayed bone age is due to subthyroidism. In many instances it is due to allergy. In the particular instance just mentioned, both were present. It is interesting to note that little progress was made in the correction of the child's orthodontic deformities until thyroid therapy was instituted. Shortly after he began to take thyroid, his occlusion rapidly progressed toward normal, aided, of course, by mechanical means. This is not the only case where I have seen rapid progress after thyroid was given.

I do not mean to say that all close-bites are due to subthyroidism or that it is necessary to institute thyroid therapy in all orthodontic problems where thyroid deficiency exists. It is suggestive, however, that in some instances glandular therapy may hasten the success of orthodontic procedures.

I realize that we have but sketchily covered but very few of the conditions where pediatrics and orthodontics share a common interest. The relationships between the two specialties embraces a broad and ever-widening meeting ground. May I emphasize that the majority of the causes of malocclusion provoke conditions not commensurate with ideal health in other parts of the body.

Four or five years ago in a discussion of diet requirements in the growing child before the Alameda County Dental Association, I objected to dentists giving out diet lists to their patients because I felt, and still do, that a diet is an individual thing and should be prescribed only after a complete physical examination has been made. I now realize that the reason many dentists were giving out diet lists to their patients was a lack of cooperation by the practicing physicians. Too often, when the general dentist or orthodontist asks for help he is answered by the physician with, "Perhaps you had better give Johnnie a little more calcium." Now it is quite true, because of the imperfect state of our knowledge, the physician may be unable to be of much help, but you have a right to demand that we examine your patients completely, investigate their nutritional state, ferret out potential allergies, and recognize glandular imbalance. If this is done, much of the pathology common to both orthodontics and pediatrics will be uncovered. By our mutual cooperation a growing child will have the advantage of a more complete and better rounded dentomedical care.

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THE PHILOSOPHY OF TREATMENT WITH THE LINGUAL ARCH

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THE philosophy of the lingual arch, its contruction and use, has been the life work of Doctor Mershon. What I received from him, I bring to you today as he gave it to me and others in his teaching classes, his writings, and personal conferences. He has taught the lingual arch technique to literally hundreds, and many of you here have been his students. I have nothing new or of my own devising and to those who have been in Doctor Mershon's classes, this will be a short review of his teaching. I feel we owe a lot to Doctor Mershon, and I personally acknowledge my debt of gratitude for all he has done for me with his inspiration and encouragement, his ever-willingness to listen to problems.

The lingual arch was developed by Doctor Mershon as the result of his observations and experiences in the treatment of many cases. The appliance, as we know it today, was not a sudden discovery. Rather its evolution has been gradual and, as experience in its use was gained, better ways of making it, and the attachments to it, were worked out. The first lingual arch used by Doctor Mershon was made in 1908. It was constructed of large size German silver wire. Round tubes, with the distal ends closed, were soldered horizontally on the lingual surfaces of the molar bands and the arch was sprung into place. This first lingual appliance was used in the mandible in treating a Class II case. The large size labial arch, as used at that time, was irritating the cheeks and lips, and Mershon reasoned that if you can pull teeth with an outside wire, you can push them with an inside wire. Very early in its development it used to be made in three sections; an anterior and right and left side arms which were soldered to form the arch. Then, too, it was contoured or bent to conform to the lingual surfaces of the teeth. But this earlier technique was soon discarded and the wire, now of one piece construction, was adapted in a general manner to the irregularities the case presented. Another change was that of placing the lock wire distal to the half round post, where formerly, it was mesial. In its mesial position, the lock wire formed a food pocket and at times would prevent the proper placing of an auxiliary spring. These refinements in design are only a few of the many but they serve to show how the lingual appliance was evolved by Mershon, and as he says, "It has been with me a process of evolution of a system and method of practice, born of experience and observation of the application of mechanical forces to the natural laws of biology."

The classic requirements of an orthodontic appliance are: 1. Efficiency; 2. simplicity; 3. stability; 4. inconspicuousness; 5. cleanliness.

Read before the Southwestern Society of Orthodontists nineteenth annual meeting, Feb. 18 to 21, 1940, Houston, Texas.

The lingual arch exemplifies these qualifications to a greater degree than any other appliance in use today. It is efficient if one understands how to use it, such understanding being based on what the effect will be on vital processes. Its simplicity is self-evident when compared with other systems of appliances using many bands and wires. It can be stabilized to any degree necessary to meet the requirements of any particular case. Its inconspicuousness and cleanliness are also self-evident. Just here, I wish to point out that the lingual arch is not a universal appliance, and more than that, there is no such thing as a universal appliance. Indeed, some cases cannot be treated by any form of appliance or by any known method of procedure. In many cases, the lingual arch is used in combination with other appliances such as the labial arch in the maxilla with hooks for elastics in the treatment of Class II cases. In Class III cases, the lingual arch in the maxilla is often used in combination with some other form of appliance in the mandible which can be attached to several teeth in order to stabilize the anchorage.

In order to be able to use the lingual arch to obtain the best results in treatment, certain fundamental principles and natural laws of biology must be understood. The first and most important is growth. The organism grows and orthodontic treatment is possible only because of growth. Changes take place in response to stimulation but stimulation may be harmful or advantageous. Heredity also has its influence in that it establishes the size of parts, our height, the color of hair and eyes. It also determines the size, shape, and number of cusps of our teeth, all of which may be influenced by changes of environment or natural variation, or both. We cannot disregard heredity, environment, or variation in our treatment.

There is a definite relation between form and function. The term function should be understood to mean action or use, either normal or abnormal as contrasted with the term used in the sense that the cells of an organ function to secrete, etc. To illustrate it better: the tongue, by abnormal thrusting between the incisors, causes an open-bite, but the tongue, at the same time, also functions in a normal manner through its taste buds. In the second sense, function has no effect on form but in the first, it does affect the form of the dental arch. Normal function then is necessary for normal occlusion. All the muscles, teeth, jaws, and joints must function in a normal manner if normal occlusion is to be maintained. Abnormality of any of these associated parts will be reflected to a greater or lesser degree as an abnormality in other parts, which may be abnormal or malocclusion. Growth and development of the jaws and face will be affected by abnormalities of form or function, such as loss of teeth, congenitally missing teeth, supernumerary teeth, cleft palate or, in fact, any interference with the normal processes of growth.

Formation and growth of the jaws begin early in the life of the individual. The face and jaws, as with all other parts of the organism, have two distinct periods of development; first, that which is concerned with shaping or formation of the parts, previous to functional activity; second, the period of growth and development which follows functional activity and is dependent upon the stimulus of function if normal growth and development of the parts are to be fully realized. The most important function necessary to harmonize

the various structures of the face and jaws to the requirements of the teeth, is that of mastication. It must not be supposed that these two developmental factors are to be considered as separate working forces, for they cannot be separated. Both must work together to complete the normal structure. This will be clear if we remember that the developing structure is not the cause of function nor is the future function of the part responsible for the structure, but both are dependent on each other and must develop together. Any change or modification of one will result in a change or modification of the other.

By about the fourth month of embryonic life, the tooth germs of all the teeth, including the first permanent molars, are present in some form in the jaws, and the deciduous teeth, partially calcified, are in their crypts. There is, at birth, very little angle to the mandible as it is nearly straight from condyle to symphysis. As the deciduous teeth erupt, the alveolar process is built up or developed to support them, and by the age of three, the deciduous dentition is usually complete. At this time, in the jaws will be found most of the permanent teeth in their crypts. Indeed, it is remarked often that with the small amount of room available, it is a wonder that teeth ever erupt to a normal arrangement. It is important to note, right here, that the alveolar process which is formed to support the temporary teeth disappears or is absorbed when they are shed, and a new alveolar process is built or formed as the permanent teeth erupt.

Changes can take place in the skeleton in relation to muscular habits, and in cases of disease from paralysis of limbs or of facial paralysis, changes undoubtedly occur, yet it is certainly true that variations in muscular activity can, at most, affect only the surface and not the essential form and structure of the bone. Use of muscles strengthens them, but it should be noted that increase of size does not mean increase in length. No evidence has ever been produced to show that any increase in the length of a muscle can take place after it has reached its full hereditary size. It will be evident from this that any opening of the bite beyond its normal, whatever that may be, as determined by the length of the muscles, is doomed to failure, since after the treatment period is over, the teeth or prosthetic restorations will finally adjust themselves to the positions required by the all-prevailing muscular dominance. "You can push teeth to where you *think* they belong. Nature will move them to where they will best adapt themselves to the rest of the organism."

The above rather briefly stated natural laws are fundamental and are the basic biologic principles upon which the lingual arch technique is based. All too often our theory is biologic, but we forget it when the patient is in the chair and we practice mechanics. In the use of the lingual arch and its attachments we must constantly keep in mind the fundamentals of biology and the natural laws which were responsible for the development of this method of treatment.

In each case there is a time in which it is best to begin treatment. It is not good orthodontic practice to begin treatment just any time the case comes to the office. Too many times we, as orthodontists, think we have to do everything, and we forget that we are dealing with a growing, developing organ-

ism. Growth and change are the main activities of youth, and it is amazing how much development will take place if we but give the organism a chance.

At this point, the question arises as to how much influence the treatment of the temporary dentition has upon the development of the permanent dentition. True bone is not influenced by treatment. It is present only for the attachment of muscles. The size of the true bone or body of the jaws is determined largely by heredity, but the form and size of the alveolar process are greatly influenced by function. Since the temporary alveolar process is replaced by a new alveolar process for the support of the permanent teeth, how much change in the shape and size of the permanent arches will be produced by treatment of the temporary dentition? From this, it is not to be assumed that early treatment is never indicated but rather it is pointed out that, in many cases, early treatment is of no value and often is a waste of time.

True, there are conditions of interference with normal development which should be corrected as soon as discovered, as for illustration, cross-bite in the incisor region in which one or more incisors in either jaw are in false mesial or distal relation to the opposing teeth of the opposite jaw. The establishment of the proper relationship of these teeth is often all the help needed to allow normal development to take place.

Extreme cases of distocclusion (Angle Class II) or mesiocclusion (Angle Class III) may well be treated as early as possible because of the general influence they have on the development of the face and jaws. It should be made clear that subsequent treatment periods will be necessary some years later, since cases cannot be finished during this early treatment period.

Orthodontic treatment should not be continuous. All that should be attempted is to bring the case to the normal that corresponds to the growth period of the individual. These various stages or periods are designated by the erupting of the permanent teeth. The first permanent molars and the incisors, when they erupt, represent such a period, so also the premolars, canines and second molars, a second period. The final and most important period is represented by adolescence. This is a time of greatly accelerated growth and development, and it is during this last growth period that cases which require treatment can be finished. In the earlier periods, teeth cannot be moved beyond their proper or normal positions without producing a disharmony of the parts, and, if so moved, may relapse, more or less. This relapse is evidence that the movement is too fast for the age normal. Natural growth processes cannot be hurried by mechanical methods. For instance, eggs take a certain length of time to hatch. Turning up the heat in an incubator will not hatch them sooner but will, probably, destroy them instead. Much of the trouble and grief we have, both in treatment and misunderstanding about the length of treatment, can be traced to the false idea that we can hurry growth.

Overtreating, constant fiddling with the appliance, is a fault we all seem to have. In any case requiring treatment, our objective should be the normal for the stage or period of that individual's development. All appliances should then be removed to allow for the functional development and adjustment of all the correlated tissues.

The removal of appliances at this stage of treatment has been designated as a rest period. But this term "rest period" does not describe what really takes place. These are not periods of rest but rather stages in treatment without the use of appliances during which growth is free of restraint and the teeth have a chance to take positions in harmony with the rest of the developing parts. Changes which take place show the direction and efforts of nature, the trends or tendencies toward which that individual growth pattern is developing. It is this growth pattern in each individual which makes our cases different and which we must sense and appreciate in our treatment. Rest periods then can be more exactly defined as periods in which the jaws and teeth are given the chance to harmonize and adapt themselves, by unrestricted growth and function, to the rest of the developing organism.

The rate of growth and final resultant form are individual. No chart, diagram, or index of measurement which is deduced from the average can be applied to the individual, except in a very generalized manner, because such charts and measurements cannot possibly show when or how much that individual will grow. Growth may be early or late, fast or slow; no two cases are alike, either as to rate, time, or result. We are treating growth, not teeth; therefore, the more accurately we are able to interpret the growth trends of the individual, the more nearly we will approach the individual normal in our finished cases.

During the rest periods, or more accurately, this period of functional adjustment, no retainer should be used because, as has been pointed out, any relapse is evidence of too rapid movement, indeed such a relapse is a blessing in disguise. Retention is one of the procedures which is contrary to and opposed to the natural adaptations brought about by growth. It is impossible to detect or sense the balance of forces acting on the teeth or to know when we have reached the limit of development in any case. Therefore, any device which will prevent or restrict growth is contraindicated. The idea of a retainer is out of harmony with the philosophy of treatment with the lingual arch and is an admission that we have missed out on some essential factor in the treatment of the case. In treatment we must always give growth all opportunity to attain its full inherent possibilities.

There is a limit beyond which teeth cannot be moved with any hope that they will stay even if retention is resorted to, regardless of how long such retention is employed. What this individual normal limit is, for any case we treat, we do not know. Indeed *normal* is not something exact. It is rather that condition in which all the correlated parts of the organism are functioning harmoniously. It is individual for the organism and not like any other in all its attributes. It is so individual that we do not know whether or not we have attained it in the treatment of any case.

The problem of missing teeth, as to whether or not to close spaces or open them for substitution, while interesting and presenting a wide field for discussion, nevertheless, is properly a part of diagnosis and cannot be considered within the scope of this paper. So, also, the question of extraction but it may be said, in passing, that extracting is seldom, if ever, necessary though there are extreme cases to be considered under this heading. But again, it is a question of

diagnosis and not a part of this paper. These and similar questions all relate to an individual case and can be solved only by the best judgment of the operator who sees the patient and has all the data before him. In other words, these are academic questions about which no rule can be formulated. The solution must be based on the individual requirements of the particular case.

No rule can be made regarding any single case as "no two cases ever respond to the same treatment in the same way." All are different and have different rates of growth, different vital processes. "It is the vital processes in a developing child that cause teeth to change their positions and not the appliances."

To some, this may seem too generalized, but I assure you it is not, for by thoroughly understanding the philosophy of treatment and by a common sense application of the natural laws of biology from which this philosophy was derived, the application of appliances and method of treatment should present little difficulty.

The lingual appliance consists of bands fitted to the first molars with half round tubes soldered to their lingual surfaces and an arch wire adjusted to the lingual surfaces of the teeth close to the gingiva, having half round posts soldered to it near the ends, so it can be fitted into the half round tubes on the bands. This main arch wire is .036 in most cases but larger gauges are sometimes used. It is not bent into the interproximal embrasures, but it should touch most of the teeth, following along the gingival margins but not impinging on the soft tissues. It is not necessary to bend the wire into narrow spaces between malposed teeth. The main arch is rendered passive on the model during construction by heating it and pressing it into position while hot. The appliance is held in place by lock springs soldered to the distal ends of the main arch. These are curved to follow the contour of the soft tissues and the free end is bent to pass under the gingival end of the half round tube on the band. The bands and the arch wire are placed in the mouth as nearly passive as possible. It is easier to adjust the arch to a passive position if there are no attachments added to it at this time. Also by taking out the bends in the main wire and bringing it to an ideal shape much correcting of the case can be accomplished by the use of the plain arch alone. In any event, it is better to attach auxiliary springs at a later visit, after the patient has become accustomed to the appliance, because the auxiliary springs can then be more accurately adjusted.

Auxiliary springs are of several types and can be modified and changed in countless ways to meet the requirement of the particular case. They are made from a springy gold-platinum wire and the diameters vary from .020 inch to .030 inch according to the type or purpose for which they are designed. The .020 inch size is by far the most commonly used as this gives a gentle stimulus over a long period.

In the use of the lingual arch nearly all movement is accomplished by the auxiliary springs but, as previously mentioned, the main arch wire is also used, particularly at the start of the case. Auxiliary springs should be of such size as to deliver the minimum amount of force. Auxiliary springs

should not be thought of as applying pressure but rather as a means of gentle stimulation. In the use of this appliance the mistake made by many operators is that of bending the springs at every visit of a patient. Once adjusted they should not be adjusted again till after all of their force is expended. This point is of great importance, so I will repeat it. Do not bend the auxiliary springs at every visit. Do not readjust them until they have expended their force nor for some time thereafter. Let them alone! Adjustments should not be oftener than once in three or four months. Much better results will be attained if this desire to rush things is curbed. Long intervals between adjustments will allow the teeth a chance to make the functional changes necessary for the normal of that age. Also frequent adjustments cause tipping of the teeth and of the molars by reciprocal force and this tipping of any teeth during treatment all too plainly shows the use of too much force, too frequent adjustments or both. Very little bending at any one time and long intervals between such adjustments will result in a finer finished case. Keep in mind, we are treating growth, not teeth, and that growth is slow. It cannot be speeded up by bending wires. All that appliances can do is to change the direction of growth, but not its rate. You do not manufacture growth with an orthodontic appliance. If you think you do, put an appliance on a skull and see what happens!

The amount of adjustment is also of importance. It may be best stated that only the minimum amount necessary to cause tooth movement should be used at any time. Any auxiliary spring that will cause a displacement of the main arch has too much adjustment. Teeth will move away from the lingual arch as the result of growth even if it is not pressing against them; indeed, the main arch is often refitted toward the end of treatment with all springs removed and the arch shaped to ideal form. It is thus very effective in the final rounding out of the case, as by its very position, it shapes up the occlusion. It was this observation which first led to the discovery of the principles of the lingual arch.

Another common mistake most of us make is that of trying to do the whole case at once. As has been stated, orthodontic treatment should not be continuous but should be taken up in stages to correspond with the age normal of the individual. As a general plan of procedure, the first step should be to establish proper molar relationship as these teeth are truly the key of the arch. Next and just as important is proper positioning of the canines. The incisors usually cannot be aligned until these first two steps have been carried out, but an exception to this occurs in cross bite in the incisor region, as previously mentioned. Last of all comes rotation of individual teeth, and this should not be attempted until there is *enough* space for the movement to take place. It will be self-evident that all these steps will not be possible at one and the same time. Rest periods and growth periods will intervene with treatment periods, steps which are in relation to the stages of development of the individual. The case cannot be dismissed as finished till the final growth period which is somewhere in the teens or early twenties. Cases cannot be finished just whenever we want them to be. They can be finished only when the proper period of development occurs because teeth will change and will

continue to change during all the periods of active growth. It is only when growth changes cease that the teeth and jaws may be said to have reached their final developmental positions. Changes still take place in the jaws and face long after our work is over, but if we have attained a reasonable degree of normalcy with the lingual arch technique in the treating of a case, such subsequent changes will be slight.

In conclusion, the following brief summary will emphasize the important points in this paper.

The lingual arch technique is based upon certain natural biologic laws which must be constantly kept in mind when we make and adjust our appliances. Failure to realize we are treating growth and not teeth, may result in disappointment.

Orthodontic treatment should not be continuous. It should be taken up in stages corresponding to the age normal of the individual. Only that amount of treatment to bring about the normal arrangement for the particular age should be attempted at any time. No case can be finished until some time in the late teens or early twenties or, in other words, till the last growth period is over.

Growth is a natural process. Appliances may change the direction of growth or may interfere with or obstruct it, but they cannot speed up or change its natural rate or cause it to take place.

Normal is the correlation of all the parts of an organism best suited for the functioning of that particular individual and it is unlike any other. We can never be sure we have attained the normal in any case we treat.

In the use of auxiliary springs, the minimum amount of pressure necessary to move a tooth, not the maximum, should be employed. Auxiliary springs should not be adjusted at every visit. Adjustments should be infrequent. Give growth a chance to bring about that functional adaptation of the teeth which is normal for that individual.

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THE RELATION OF ORTHODONTICS TO THE PRESENT SOCIAL TREND

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INTRODUCTION

ECONOMICS is the important world problem of the day; there can be no economic upheaval without social readjustments. No part of society can escape the entanglements of the upheaval or its repercussions.

Orthodontics is a highly specialized service. Where it is to be catalogued depends upon the attitude of the people toward it. It naturally follows that their attitude depends upon the degree and kind of understanding that they have of orthodontics as imparted to them by the members of the dental profession of which orthodontics is a part.

Since dentistry, like medicine, like law, like business, is a part of the social structure, it follows that dentistry is and will be enmeshed in the social readjustments that are taking place today and that will follow tomorrow.

Several pertinent questions enter my mind which lead me to believe that as dentists we need to assume a realistic attitude in our analysis of the present social situation.

THE SOCIAL SITUATION

Where are we? Where are we bound? These are difficult questions for which we have no answer. With the complications which have arisen in our national, state, local, professional, and even personal affairs, no opportunity seems to present itself to think the situation through. However, for the sake of discussion, let us analyze some of the changes that are occurring in our social structure with which you may or may not be familiar.

Of the several hundred departments, offices, bureaus, committees, subcomittees, committees-at-large, and so on and on, that constitute the working machine in Washington, I shall mention only three—not that their function is any more important to us than the function of the others but so that you may know more about their function. These three groups are (1) the Public Health Service, (2) the Interdepartmental Committee to Coordinate Health and Welfare Activities of which Josephine Roche is chairman, and (3) the White House Conference on Child Health and Protection.

Each of these agencies of our national government has been engaged in a constant study of social conditions. Two of these agencies have devoted the majority of their time to the problems of health. Without a clear understanding of the objective, which our national government seeks, the workings of these groups lead one to believe that our government could more realistically be called a sociocentric democracy. No doubt our strong national belief in the social gospel accounts for the social trend which we, as a nation, have taken.

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One cannot disregard the principles of collectivism that are a part of all movements that tend toward a social-minded government. The present form of government in the United States is our government—that is, yours and mine. The more centralized it becomes, the more collective its viewpoint; the less it is our government. There is no opportunity for us to be on the outside looking in. As Julian Huxley says, "The methodology of social science is inevitably different from that of natural science. It is different and must be different for one basic reason—the investigator is inside instead of outside his material. Man cannot investigate man by the same methods by which he investigates external nature." We are in the whirlpool of this social reformation. Though the danger of being pulled into the vortex of the whirlpool is probably in abeyance for a time, we cannot float to safety. The outcome of our egress from this social maelstrom will depend upon our ability to maintain an equilibrium in our thinking. As a class of or branch of society, we cannot disregard the thinking of the whole group. Therefore, it is quite evident that orthodontics must be related to the present social conditions for the best interests of society as a whole *without prejudiced beliefs.* The degree to which this can be attained will depend upon the understanding of the whole of society. Unfortunately, certain groups have set forth information that has not been wholly reliable from a realistic point of view.

Theory is one thing; the degree of its attainment is another. Theories, though predicated upon scientific analysis, cannot be practicalized until the intellectual level of the group for whom they are intended can understand and apply them. Social science recognizes these limitations. Many social workers do not. May I add that the health service professions must not be overzealous in their desire to convince the people that they need services, or that these services are available for all of the people, *until* they are reasonably sure that the people can understand the intention of the health service professions.

Kingsbury, in drawing conclusions from innumerable studies that have been made covering what constitutes the minimum American standard of living, says, "Many studies could be cited to show that if the variable costs of health and medical services are to be capable of being budgeted—along with food, shelter, clothing, and other necessities—by individual families, at least $3,000 a year and possibly $5,000 a year is necessary. In other words, the costs of medical care are so variable that only families with at least $3,000 a year, or possibly with at least $5,000, can individually budget against sickness costs." Incidentally, these figures do not include the cost of dental care. From the book, *America's Capacity to Consume* by Leven, Moulton, and Warburton of the Brookings Institute, one learns that "21.5 per cent of families (of two or more persons) in the United States had, in the year of 1929, incomes under $1,000. Another 21 per cent had incomes ranging from $1,000 to $1,500. Thus, more than 42 per cent of families in this nation, in 1929, had incomes under $1,500 a year. Over 78 per cent of the families in the United States had incomes under $3,000. Ninety-two per cent had incomes under $5,000 a year." These are 1929 figures, no one really knows what they are now. With these figures in mind, we might make an analysis of this kind.

ORTHODONTICS IN THE SOCIAL PICTURE

There are approximately 36,000,000 children in the United States. Twelve million or about one-third of these children are below the accepted economic level for the "more abundant life." I am told by one of our prominent orthodontists that fully 70 per cent of all children need orthodontic treatment; therefore, I shall conclude that 70 per cent of these 36,000,000 children need orthodontic treatment. If this is the case, by applying the figures of these social experts to the picture, it may be estimated that in round figures 25,000,000 children in the United States need orthodontic treatment. Of this group, in round figures, 8,000,000 could probably pay nothing for orthodontic treatment; only 2,000,000 could afford to pay an unlimited fee and the remaining 15,000,000 would need a reduced fee.

Probably Kingsbury's figures will serve as a starting point. The orientation of orthodontics to the present social trend is a difficult one. There are three points of view, (1) the public, (2) the general practitioner of dentistry, and (3) the orthodontist. The mother who desires orthodontic treatment for her child wants it because of the crooked front teeth. She wants orthodontic treatment from the standpoint of its "face value" to her child. The relationship of constricted arches, occlusal imbalances, and occlusal traumatoses to oral health does not enter her mind. Insofar as her abilities are concerned, she is not so very astute about judging orthodontics. She can not tell bad orthodontic treatment from good orthodontic treatment. Unless it is very, very bad, she has not the ability to detect it, and no matter how good the service may be, she cannot appreciate its true value. This mother will, very likely, select the type of orthodontic service for her child that will cost her the least amount of money. This is an American prerogative. One should not hasten to criticize this point of view of the mother without making a critical analysis.

The second point of view, that of the general practitioner of dentistry, depends upon the attitude of the dentist toward children. This attitude, that of indifference almost to the point of discrimination in some instances, is improving, though there is the possibility of much greater improvement. The indifference of the dentist to the child patient does not have a good influence on the mother. Orthodontics, to the mothers of the majority of children, is regarded as a luxury-service that is intended for those who can afford to pay for it. This is the understanding of the mother who has noticed the crooked teeth of her child, but desires to do something about them. The indifferent dentist has left this luxury idea with her. Likewise, the indifferent dentist may overlook preventive treatments for the child that would have prevented or lessened in severity the malocclusion of the second dentition. Again, one should not hasten to criticize the dentist without making a critical analysis.

There is another kind of general practitioner. He is alert, aggressive, an opportunist. He recognizes the possibilities of orthodontic treatment. He has had the usual type of orthodontic education which is afforded in the undergraduate school. He decides to treat a few cases. He has difficulties,

sometimes he consults an orthodontist, seldom, however, since the majority of dentists have not progressed to the point where they consider consultation as of any value in their practice. This aggressive dentist decides to take a course. It must necessarily be a short course because he cannot leave his practice for any great length of time. One realizes that it is an exaggeration to say that all orthodontic specialists are competent. It is equally an exaggeration to say that all general practitioners of dentistry who accept orthodontic cases are incompetent. At the same time, however, he who accepts the responsibility of announcing to the public that he is a specialist accepts the responsibilities that go with the specialty. He has announced that *by concentrated effort and study he has reached the place where he has sufficient confidence in his knowledge and ability within a circumscribed field to regard himself as an authority.*

The orthodontist has his own point of view. Based upon his superior understanding of the services of orthodontics, he realizes that the application of this service to human needs requires a day-by-day study of the biologic factors by which the correction of malocclusion is made. More and more he realizes that into every band, into every arch, into every ligature must be written the prescription that is the fruit of a scientifically trained mind. Sometimes the acuteness of immediate demands overshadows the perspective.

The orthodontists look with concern upon the practices of the incompetent orthodontic services of the general practitioner and the audacity of some of the announced orthodontic specialists. His concern is based upon his own point of view.

My contacts with orthodontic specialists lead me to believe that as a group they are more altruistic in their desires than the general practitioner. This may be said of the majority of successful groups in American society. As soon as economic freedom is in sight, then the influence of economic pressure ceases to be as pertinent as the more pressing problems of egocentric expressions. I have questioned orthodontists about their work. I find that they are interested to a considerable degree in the biologic problems that are involved in their practice. They are anxious for the orthodontists who will succeed them to have a better education than they had in the fundamental science. They, more than members of any other branch of dental science, as a whole group, recognize that their practice is more of a science than it is an art. With this concept of their practice, with their altruistic desires, with their belief that there should be better orthodontic services provided, what are the orthodontists to do?

THE ORTHODONTIST AND HIS JOB

Keeping in mind the kaleidoscopic world in which we are living, the social picture that I have painted, the differences in the points of view of the three groups that are included in the orthodontist's problem, one realizes that the orthodontist has a job to do. Most fortunately he is in a better position in this social upheaval than those of any other group, and he must not do anything to upset this position. Before we analyze this job to be done by the orthodontist, let us consider his position first.

From our contact with the mother and her child with the crooked front teeth, we can assume that the majority of mothers have the same point of view. The pleasing appearance of the child's face is all important. Crooked teeth mar this pleasant appearance. Though the services of an orthodontist are an expensive luxury, the family makes this sacrifice for the sake of their esthetic value to the child. Why not? Why change this point of view? The majority of those people who would like for their child to receive orthodontic services, then find that they cannnot afford them, accept this circumstance as "one of those things." They pigeonhole orthodontic services with the large car that they would like to own. The indigent or low level income group does not give very much thought to orthodontic service. Up until now this is the complacent situation that has confronted the orthodontist.

Orthodontists have recognized this point of view on the part of the public, just as the general dentist also has recognized it. Very little has been said to the public about crooked teeth, except that which has been told by the orthodontist to his patients. As I have mentioned previously, this is the fortunate situation in which the orthodontist is placed. There has been a considerable amount of "talk for talk's sake" given to the public about general dentistry.

The importance of the esthetic value of orthodontics must not be underestimated. The challenges of life that must be "faced" by every individual necessitate his having a pleasing countenance. One who is handicapped by abnormalities of facial contour has a permanent handicap. He is crippled. This handicap does things to him. The psychologic entanglements become social problems. Therefore, orthodontics is an important factor in mental health which is the newest phase of health science to be included in medical research. Therefore, why not let the mother of the child with the crooked front teeth continue to think of improving the appearance of her child's face?

The health value of orthodontics is so significant that I need not mention it to you. You understand it better than I. It is a vital factor equal in importance to the esthetic factors. Therefore, orthodontists have been zealous in their attempt to educate those who have come to them in the health values of their services. The efforts of the orthodontist in this respect have been successful with this group, *but only with this group.* I know that they are successful because in my many contacts with the members of the boards of various social agencies these people ask me about orthodontic services for this or the other less fortunate child whom they chance to see. These board members are mothers of patients of orthodontists. They are the people with means who have reached the point in life where they desire to help the less fortunate individual. I do not wish to imply that this is the only group who is receiving orthodontic services. However, they remember and are trying to relate the health values of orthodontic services that you have taught them. They are wondering if orthodontics is so important for the health of the individual, why all children should not be given the service.

This is part of the job that I mentioned that the orthodontist needs to do. If the orthodontist's appreciation of orthodontics leads him to believe that it *is* a health service, that it *is* a social need, then he must be ready with an answer

to this question. How can orthodontic services be supplied to those who cannot pay for them?

Immediately you realize that this is a hopeless task, just as the idea that all children who have carious teeth can have them filled and their mouths kept in a healthy condition.

In this connection, I like to quote the rather interesting picturization of dental statistics as made by Guy Stanton Ford, "If all the dentists in the United States were marshalled on the Atlantic Coast and started on reparative work and worked westward, it would be a hundred and twenty-five to a hundred and fifty years before they would reach the Pacific Ocean. By that time there would be behind them generations who were suffering from the same things which they had just repaired." If there are not enough dentists, how then can the orthodontists be able to correct overnight a condition that has been prevalent among children ever since there have been children? In my opinion, there is a logical approach to the problem. There *is* something that the orthodontist can do.

First, I believe that the orthodontist should recognize that more well-trained orthodontists are needed so that every community may provide this type of service. It is essential to develop postgraduate schools in dentistry that will provide the proper type of postgraduate instruction in the various fields of dentistry. By educational methods the public will learn that the authoritatively trained specialist is the one who holds a certificate in the specialty upon which he has concentrated his efforts—this certificate to be granted by the national organization of the special group. This seems to me to be the proper way to control specialized practices. Laws are static; they do not protect that which you wish to protect. Ethics in society is a matter of believing rather than that of policing. Therefore, by process of evolution, the audacious orthodontist will be brought under control. The general practitioner of dentistry who desires to include orthodontics in his practice will, of course, continue to do so. The postgraduate course in the University will provide the graduate education. He will learn that to keep his orthodontic patients from seeking treatment from the more qualified orthodontic specialist, he must be prepared to render an equally satisfactory service. His understanding of the principles of orthodontics will be better, since he will have been educated in these principles in this manner to be described.

It is my belief that every dentist should be doing something about orthodontics. If he does not care to render a satisfactory type of service to children, then he should not accept them as patients, but refer them to a dentist who desires to render service to children. It is the responsibility of the dentist who has been educated properly to see that the child receives a *whole* oral health service. This dentist recognizes his limitations and performs only those services for the child that are within the range of his abilities. He knows when to consult. He knows when to refer. Above all, he understands the true meaning of prevention.

The undergraduate dental school must educate dental students in the prevention of the preventable malocclusions. While it is essential that they become well grounded in the aims and purposes of orthodontics, the biologic principles

involved, and the theory of practice, they should not be given one or two cases of orthodontics to treat in the course of their undergraduate education and be led to believe that they know how to treat malocclusion. They should know every means of prevention. If there are practices or methods available that will prevent malocclusions, I think of a space maintainer for one, then these are the types of methods that should be taught to the student in the laboratory and in the clinic. He should perform this type of service *as a part of his routine clinical practice* and not as a specialized orthodontic treatment. With this type of training, he should be given observation courses in clinical orthodontic treatment. The purpose of these courses is to lend emphasis to the preventive treatments that the student actually does since they will demonstrate the results of neglect. Again, by the process of evolution, the general dentists who practice orthodontics will diminish in number, or will seek the type of training that is acceptable to the qualified orthodontic specialist.

I have not mentioned public education. I do not believe that there should be any special orthodontic education. I have always been of the opinion that general health education is more advisable than specialized health education. Orthodontic health education should be included in the general oral hygiene health program. The education of the general dentists in the prevention of preventable malocclusion is a fertile field where the orthodontist can do effective education. Probably this would suffice, since the dentist in his contact with one-fourth of the children in the United States would be educating these children in the values of orthodontics as a health and esthetic service. It is a slow process, but with the facilities that are available, it appears to be the most logical method.

CONCLUSIONS

There is no opportunity to foretell the outcome of the present socio-economic palpitations. With the facts that we have at hand, our safest course is to be alert to every situation. By no means do we want to disturb the American way of doing things. We should not become alarmed because of the social discoveries that are being made by a vast army of social workers. Their findings are valuable *as* findings. The material that they gather must be used as research materials, without emotion, without prejudice. There is probably no more dental caries or malocclusion today than there was one hundred years ago. We are finding more. The solution to scientific problems cannot be brought about by revolution. They can be solved by study and evolution. So it is with orthodontic services. Probably 25,000,000 children do need orthodontic treatment. There may be 25,000,000 children in the next generation who will need it. The problem, therefore, is not to become so upset about the present 25,000,000 children that we forget about the oncoming 25,000,000. Orthodontists will have made wonderful progress if in the next generation they can reduce the number of children needing orthodontic treatment to 10,000,000. With this one objective in mind, no doubt, there will be ways and means provided by that time to provide the proper treatment facilities for these 10,000,000 children.

Orthodontists, too, as is the case with all professional people, must become a more integral part of society. They must realize the important place that they occupy in their community, and the influence that they could be in molding public opinion. Orthodontists have a job to do in their communities other than orthodontics. Here is what Huxley wrote about this. He says, "The first need is to recognize that a free country, in this increasingly complex world, cannot exist, let alone find satisfaction, without being self-conscious, and all the agencies of public opinion must be molded to this end. A self-conscious society would be one in which every individual comprehended the aims of society, his own part in the whole, the possibilities of intellectual, artistic, and moral satisfaction open to him, his role in the collective knowledge and will." When this is accomplished, orthodontists will be recognized as social scientists. They will have rendered a health and welfare service to the people. They will have made these services available to *all* of the people in the American way—we have no room for any other!

REPORT ON TREATMENT OF CLASS III

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IN THE article "Fact and Fancies in Orthodontia" by Samuel Hemley, published in the AMERICAN JOURNAL OF ORTHODONDICS, 1938, page 836, we find the following passage: "However, no textbook and no scientific journal that has ever come to my attention has demonstrated one of these cases (Class III) successfully completed." And a few lines below "If Class III malocclusions in which there is a definite overgrowth of the body of the mandible have frequently been treated with good success, I think that the individual or individuals who have such cases to demonstrate owe it to the profession to report them."

Fig. 1.—Profile view of Case 1 before treatment.

This remark and the wish to fulfill the mentioned duty toward the profession have induced me to report a case belonging to Class III which was treated with permanent success. I wish to emphasize that this paper describes or, better, only outlines the principal phases of the treatment. A more detailed description may be the subject of a later paper.

*Formerly of Brno, Czechoslovakia.

Case 1.—When the patient presented for the first time in 1932, she was 22 years of age. She consulted with regard to an operation. The date for the osteotomy had been set for the next day. She wanted, however, to have my opinion before undergoing this operation. Fig. 1 shows the facial profile view of the patient.

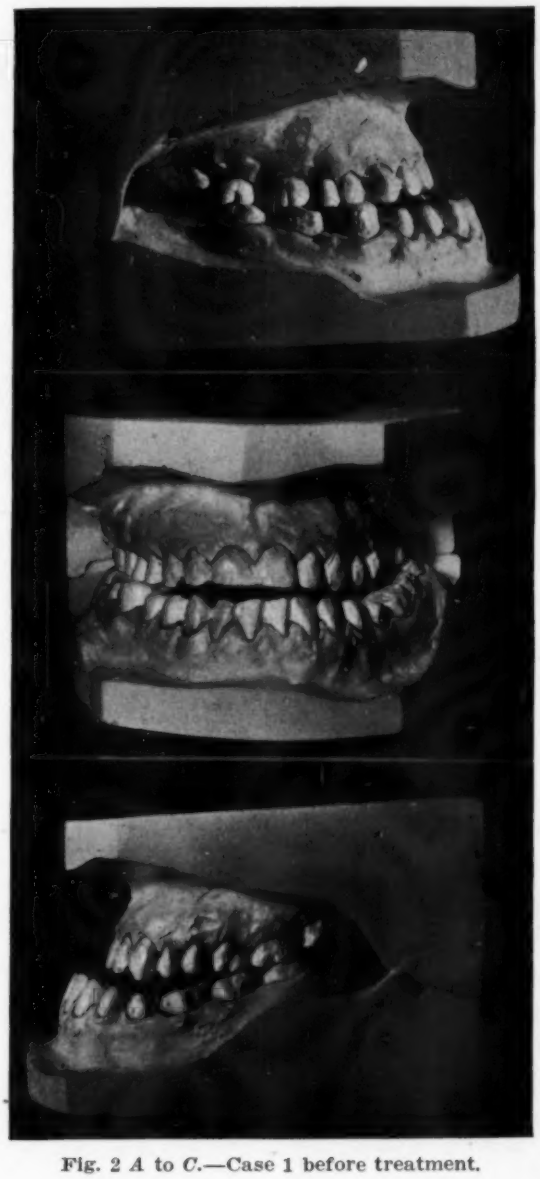

Fig. 2 *A* to *C*.—Case 1 before treatment.

Fig. 2 illustrates the occlusion of the teeth. In order to establish the exact mesiodistal relationship of the maxilla and the mandible the impression was taken first from the right half of the mouth, and the plaster was allowed to set, with the teeth in occlusion. The impression was then taken out, and after trimming and varnishing of its rims especially in the midline, this half was again inserted. The same procedure was repeated in taking the impression of the left half. It was not difficult to fit these two sections together by means

of links, thus obtaining the models shown in the illustration. In the present case this method could be applied without difficulty because the plaster of Paris was not damaged by the occlusion. As shown in Fig. 2, the anomaly prevented the occlusion of all teeth, with the exception of the two maxillary second molars and the two mandibular third molars. A dentist had provided the right first and second molars of the mandibular arch with somewhat shapeless shell crowns in order to enable the patient to masticate at least partially. The model obtained by the described impression revealed a deviation of the mandible in mesial direction amounting to more than the whole width of a molar. For instance, the maxillary second premolars occluded between the mandibular first and second molars.

Considering the advanced age of the patient as well as the records published in the literature concerning bad success in treatment of similar cases (Class III), the advice to undergo an operation seemed to be very well founded. An exact study of the facial lines revealed, however, besides a far protruding chin also an obvious retraction of the upper lip. It was to be feared that the result of even a successful surgical treatment would not be more than a very defective one, particularly from a cosmetic point of view. Such a treatment would by no means remove the retraction of the upper alveolar ridge. Furthermore the wide open-bite made the establishment of a normal occlusion by surgical means doubtful. It was at least to be expected that after the operation a supplementary orthodontic treatment would still become necessary. Therefore, in spite of all contraindications I considered the nonsurgical methods of orthodontics and advised the patient to undergo such treatment, after having obtained Professor Oppenheim's opinion as well and having received his approval.

The orthodontic appliance (according to Oppenheim) consisted of the following parts:

Mandible.—Anchor-bands were placed on the first molars with buccal tubes and bands on the canines. The mandibular first molar and canine of each side were connected by a .05 in. lingual wire. Hooks for intermaxillary elastics were soldered to bands of the canines and to the .045 in. labial archwire in the region between the lateral incisor and the canine. These hooks served as supports for the elastics only during the day. Each pair of hooks was used only every other day.

Maxilla.—A lingual appliance was made according to Gruenberg. The maxillary first molars and canines were provided with bands. They were joined by a .05 in. gold platinum wire. This wire was soldered to the maxillary canines and to the right molar, while it was supported in a buccal tube with closed bottom on the left maxillary molar. This appliance made all the maxilla one block in toto. To the bands of the molars hooks for elastics were soldered.

A chin cap of sheet copper was stamped in accordance with a plaster impression of the chin. To this chin cap two vertical rods were soldered serving for the purpose of hooking in the elastics. The latter led to the hooks of the maxillary molars. These elastics were worn during the night only.

After treating the case for about a year, the mesiodistal relationship of the maxilla and the mandible was corrected. The labial tipping of the maxillary front teeth, already existing before the beginning of the treatment, caused a considerable retraction of the alveolar process in the region of the apices of these teeth. This fact made it necessary to move the roots of the

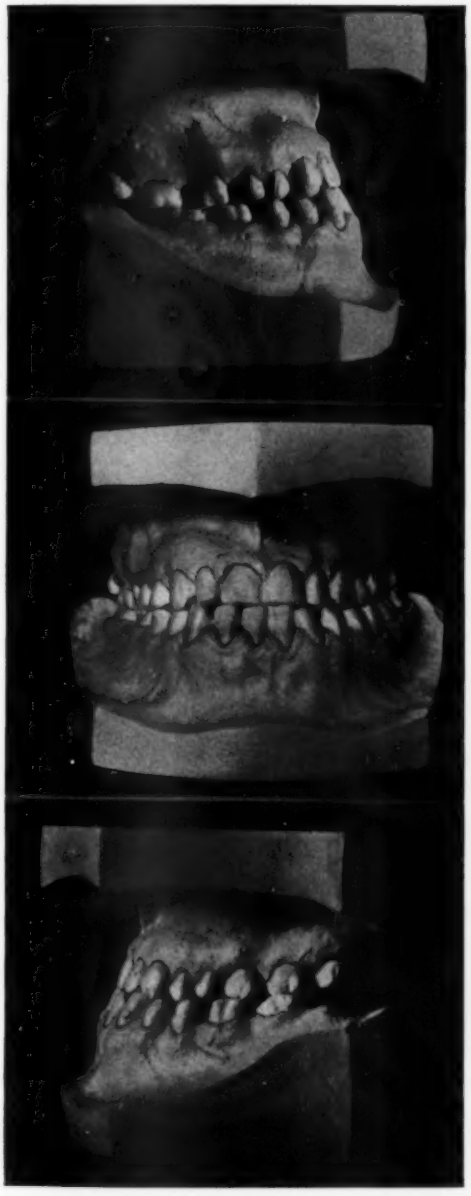

Fig. 3.

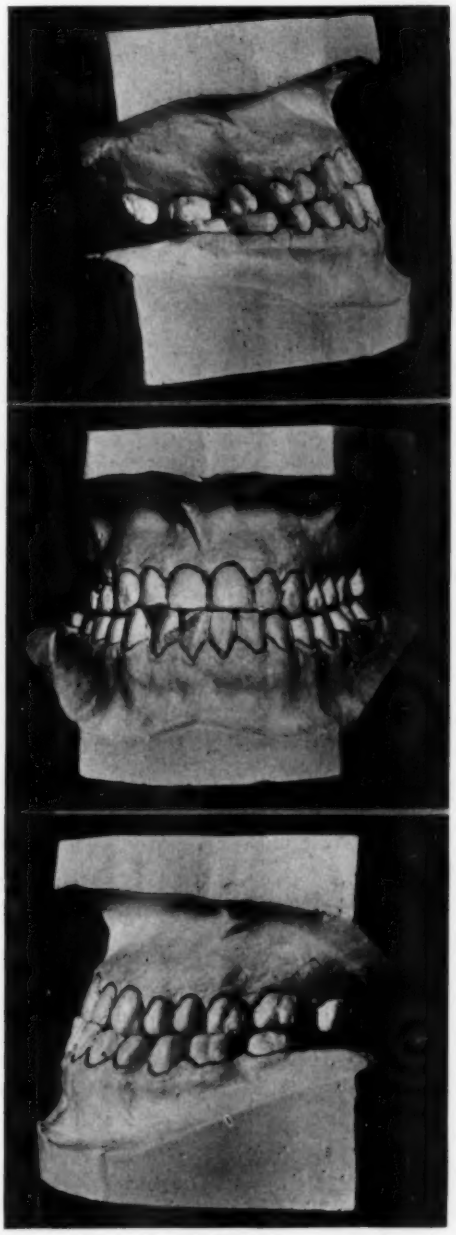

Fig. 4.

Fig. 3 *A* to *C*.—Case 1 after treatment.
Fig. 4 *A* to *C*.—Case 1 five years after removing the retaining appliances.

mentioned teeth labially. For artistic reasons also, the intention to make the achieved improvement of the articulation permanent was decisive. I had the intention thus to stimulate the apposition of bone on the labial plate of the maxillary alveolar process. This was done by carefully using a pin and tube

appliance. The appliance did not cause any damage to the apices of the roots. The roentgenogram up to this date showed not even the slightest sign of resorption of the roots.

The open-bite still existing at this period of the treatment was corrected by the use of elastics.

Fig. 3 illustrates the case after the completion of the treatment.

Fig. 4 shows the state five years after removal of the retention appliances. These consisted of a simple rubber plate (Hawley retainer), provided with small hooks for the elastics. The patient wore the elastics from these hooks to the chin cap only during the night.

Fig. 5, the facial profile view of the patient, shows clearly the artistic effect as the result of the correction of the facial line.

Fig. 5.—Profile view of Case 1 after treatment.

Case 2.—Faced by another case belonging to Class III and requiring prosthetic restoration, the previous success encouraged me to carry out the orthodontic treatment, before the prosthetic specialist started his work. Otherwise it would have been impossible to establish a normal occlusion. Emphasis is laid on the fact that the patient was in the advanced age of 44 years.

Fig. 6 shows this case before treatment.

In Fig. 7 we see the case with the corrected malocclusion and finished prosthetic work. The orthodontic treatment was in the principle the same as in Case 1.

Case 3.—Incidentally I would like to mention a case belonging to Class III which could no more be treated, as all maxillary teeth were missing, except the right canine. An almost normal occlusion was obtained, however, by applying a suitable construction of the artificial denture. The proper method for such cases is a particular formation of the curve of Spee. Gysi, the inventor of this method, called it "Hoeckerloses Gebiss mit negativer Schneide-

Fig. 6 *A* to *C*.—Case 2 before treatment.

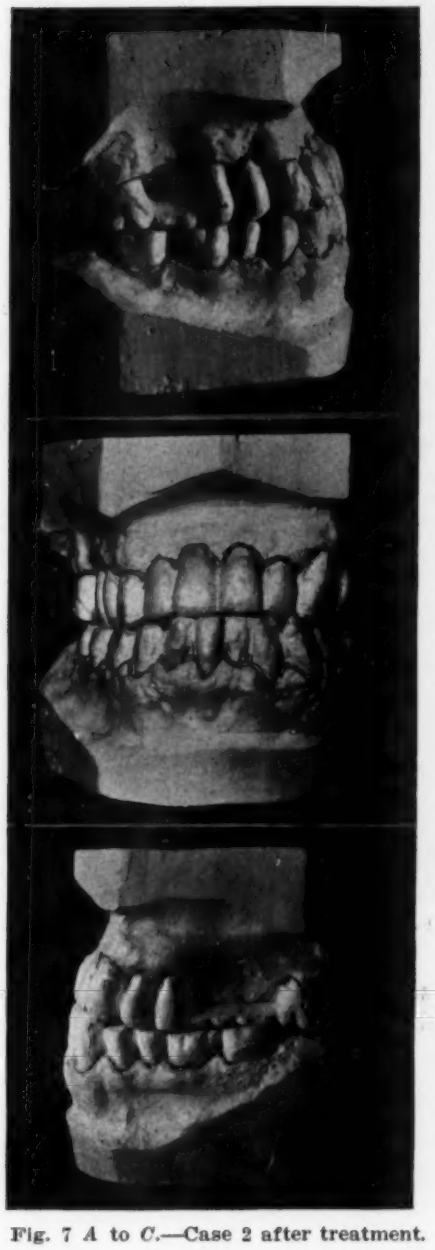

Fig. 7 *A* to *C*.—Case 2 after treatment.

zahnfuehrung." This means that cuspless artificial teeth are inserted, giving the inclined plane of the incisal rod of the Trubyte articulator a reversed inclination.

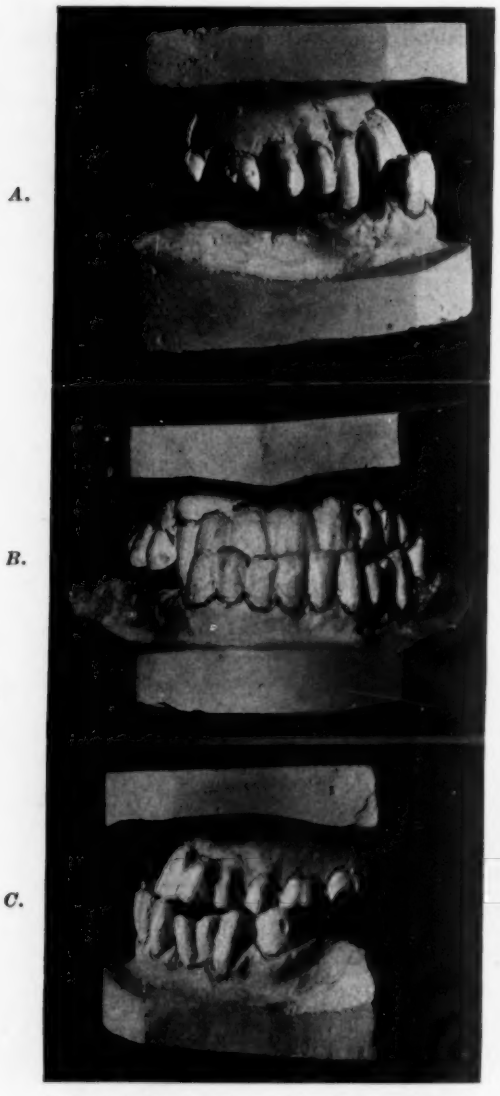

Fig. 8 *A* to *C*.—Case 3 before treatment.

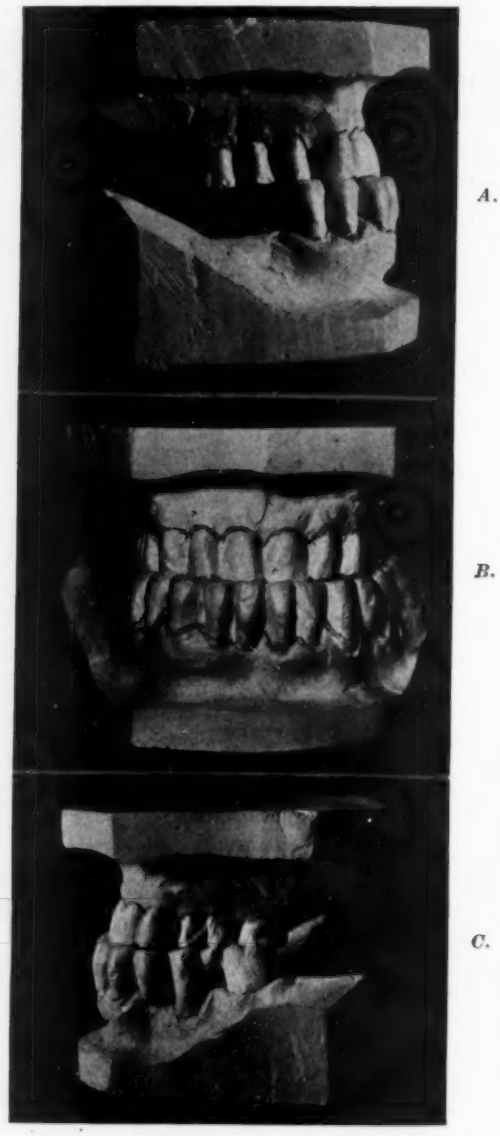

Fig. 9 *A* to *C*.—Case 3 after treatment.

I desire to extend my thanks to Professor Albin Oppenheim for the advice given me from time to time in the course of the treatments.

LATEX RUBBER AS AN ORTHODONTIC AID

GEORGE S. CALLAWAY, D.D.S., NEW YORK, N. Y.

LATEX rubber, a colloidal solution of rubber in water, can be cast in molds to any desired form to meet needs in our practice. The most successful results for use in casting in plaster molds and for use in the mouth have been secured from the protein-free *prevulcanized* latex. For office use it should be stored in bottles (preferably one-half pint size) which are kept filled and free from air until ready for use. Molds are made from plaster or other absorbent materials as the water is absorbed by the mold from the latex solution.

To cast the bite straps used for general developmental purposes the following method is suggested.

A wax pattern is made of the bite strap in any form that is desired, though the design shown in Fig. 1 is suggested. The following size has been found satisfactory to give required strength: length over all 5 inches, diameter of ball end three-fourths of an inch; shaft five-eighths of an inch thinned down to three-eighths of an inch by 2 inches for the biting end. As the water leaves the latex, a shrinkage takes place which has to be compensated for so that wax patterns should be slightly larger than the finished casting.

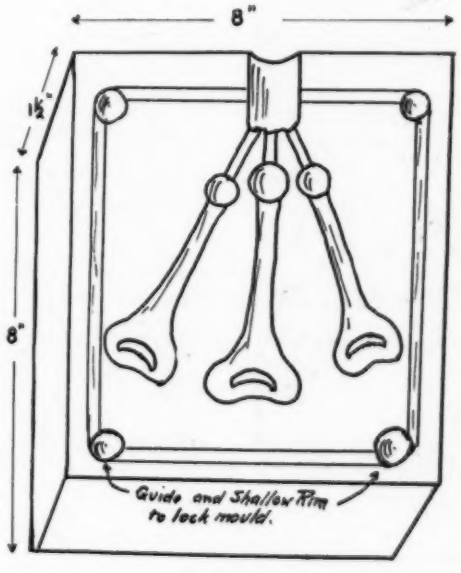

Fig. 1.

The wax pattern is invested in plaster; the wax is removed and latex rubber is *poured* in the plaster mold. After setting for about eight hours at normal room temperature the mold can be opened and the bite straps removed. These should be left to dry out as indicated by the transparent appearance or change in color of the rubber before being put to use. The use of a split mold enables one to use the same mold repeatedly to make as many castings as desired. The following suggestions are offered.

A cardboard box, approximately 8″ by 8″ by 3″, can be used to form the mold while pouring the plaster mix. Three or more wax patterns are connected together with channels which lead to a well. This well serves as a reservoir to supply material lost by shrinkage in setting of the latex. If the well and channels are varnished to prevent loss of water through the plaster walls, better castings will be secured.

The plaster mold is poured in two parts in a manner similar to investing any dental piece for vulcanizing.

Labial shields for the prevention of mouth breathing and as a help in preventing snoring can be cast in a mold constructed as in Fig. 2. They are cast in sheet form with a concave-convex form and adapted to the convex form of the labial surfaces of the anterior teeth, and held beneath the lips, thus prevent the inhaling of air through the mouth.

Bite blocks to prevent the abrasion caused by teeth grinders, and also used as splints or bite blocks while playing hockey, football, and in boxing, can be easily made for individual cases.

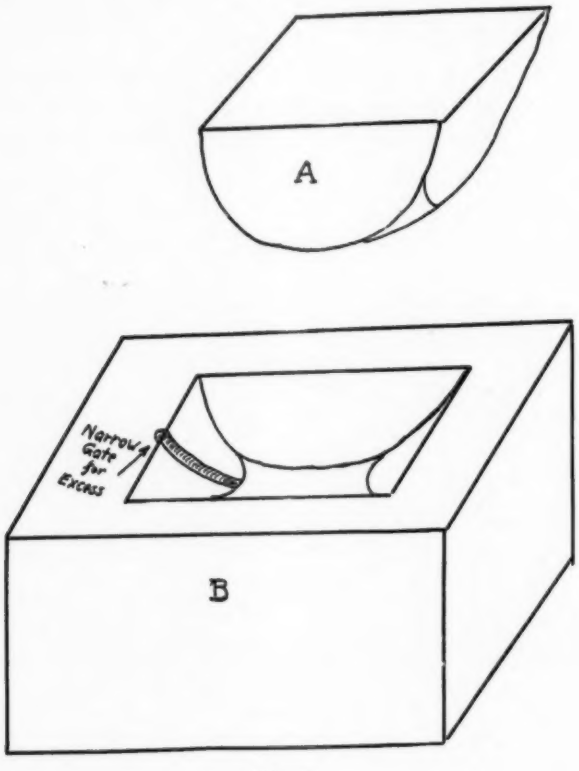

Fig. 2.

Upon an upper and lower plaster model mounted on an articulator, a sheet of softened sheet wax is molded and adapted to each model and trimmed so as not to interfere with the labial fold. The models are articulated so as to open the bite as much as is thought necessary (1 to 2 mm.), and wax is added to smooth out any unevenness on the labial side and to give stiffness or strength as needed. The wax pattern is invested in plaster; the wax is removed with boiling water. A large sprue of at least one-half inch diameter

should be placed at each posterior end of the pattern when invested to aid in pouring the latex into the mold and to act as a reservoir to compensate for shrinkage as the water is absorbed by the plaster.

This type of latex cover is a great help in keeping medicaments in contact with the oral tissues, can be used for massaging the gums, and, I believe, will make a very desirable method of retaining distoclusion cases and correction of minor malocclusion by causing corrective pressures on teeth to be moved.

654 Madison Avenue

GROWING PERFECT TEETH*

LEUMAN M. WAUGH,† D.D.S., F.A.C.D., NEW YORK, N. Y.

Announcer, Dr. Harry E. Kelsey.—We take pleasure in presenting Dr. L. M. Waugh, Professor and Director of the Orthodontic Clinic, School of Dental and Oral Surgery, Columbia University, who will talk to you upon the subject: "Growing Perfect Teeth." Dr. Waugh has made many adventurous voyages to visit the Eskimos in northern Labrador and Arctic Alaska. He has made these cruises in small boats and has brought back valuable information about the relation of food to the general health of the Eskimos and, particularly, to the health of their teeth. He could tell us, if time permitted, many interesting stories of his experiences among these far-away people.

Dr. Waugh.—If you were to stand a primitive Eskimo boy 10 years old before a group of our boys of the same age, they would think he was nothing but a little savage, and he would be afraid of them, for he would have come from so far up in the frozen north that he had seldom, if ever, seen a white man. He would never have seen an automobile, or a football, or a baseball, or a moving picture, or have heard a radio. He would never have had a piece of candy, a nice thick slice of bread well covered with jam, or pancakes and syrup. And yet, that little Eskimo would have some things that our boys and girls wish they didn't have. In the first place, he would have the most excellent teeth that you have ever seen, regular, strong, and without a single cavity. He would never have known about toothache, and though he came from a country where it is sometimes 70 degrees below zero, he would be self-reliant and laughingly happy back home. And when that boy grew to be a man, he wouldn't have any decayed teeth or suffer toothache. He would never have heard of a dentist and would really not need one.

Announcer.—Are you telling us, Dr. Waugh, that these people, who live lives of great hardship and are entirely without the things that make us comfortable and give us pleasure, have practically perfect teeth and no need for dentists?

Dr. Waugh.—I am telling you *that* and a great deal more. These people have practically none of the diseases from which we suffer. Physicians are unknown there, and I was the first dentist that the Eskimos of northern Labrador and Arctic Alaska had ever seen.

Announcer.—You began by saying that these people have perfect teeth, and, I suppose, healthy gums. You went on to say that they are free from the diseases that kill us before we grow old. Is there any relation between their excellent teeth and their excellent health?

Dr. Waugh.—Yes, indeed, there is such an intimate and important relationship that if we all understood it fully, not one of us would allow our teeth to become unclean and decay. Decay of the teeth is a *disease* which may, *eventually,* affect the whole body, but is seen and felt more plainly in the teeth than

*Broadcast on the Program of the Dental Centenary Celebration, Baltimore, Md., March 18 to 20, 1940.

†Professor of Dentistry (Orthodontics), Columbia University, New York.

anywhere else. Inflammation of the gums is another kind of disease, but it is a *disease* just the same, and when it affects the gums, you may be sure that it may also affect other important parts of the body. These Eskimos have such wonderful teeth, not because they have toothbrushes and tooth powder and use them morning, noon, and night. They have never seen or heard of them and would not know for what they are intended. ***Their teeth are so good because they do not have the foods that cause teeth to decay.*** Their bodies are strong and healthy, and the health of the teeth is, with them as it is with us, a very good indication of the health of the whole body.

Announcer.—Well, Dr. Waugh, if the condition of the teeth is a measure of the health of the whole body, the health of a lot of people I see every day isn't very good because their teeth certainly are not good. I am sure it would be of very great benefit to our audience, especially those of us who have children, if you would tell us something about how these little Eskimos grow perfect teeth and how we can enable our babies to grow perfect teeth. That would not only save a lot of suffering and disfigurement, it might save us parents a lot of expense.

Dr. Waugh.—Very well. Let's go back to the Eskimo children. First of all, their food nourishes their bodies thoroughly. They do not have sugar or candy or a soda fountain or a jam jar. They do not have molasses or any of our sweet syrups. Then, they do not have any of our white bread. In fact, they do not have bread at all. They have to live almost entirely upon the wild animals and birds they kill, and the fish and seals, and walruses and whales they catch out of the sea.

Announcer.—Just a minute, Dr. Waugh. When you talk about sugar and candy, sweet syrups, jam, and white flour, you are talking about things that play a very important part in the lives of nearly all the people who will hear this broadcast. What's the matter with those foods? And, what have they to do with perfect teeth and the good health of the whole body?

Dr. Waugh.—I don't know that there's anything the matter with those foods in themselves if we would eat only small quantities and treat them as we should, but here is the fact: If you sent those Eskimos a lot of refined sugar, candy, molasses, jam and white bread, they would love them because they would taste good and supply their bodies with heat and energy with much less effort than they must use to hunt animals and catch fish. And wherever they have been taken to them, as with those who are in frequent contact with white men, their teeth decay as rapidly as those of our children. I saw this first at Hopedale, Labrador, which is several hundred miles south of the primitive tribes of which I have been talking. Supply ships go to Hopedale, and refined sweets such as molasses, candy, and sugar, and also white flour, are shipped there regularly. And the Eskimos love sweets, and the children, especially, eat all they can get. At Hopedale, I found so many natives whose mouths had been ruined by decay, and I spent so much time extracting decayed teeth, that I could do little else. But, when I went to northern Labrador and Alaska, where the white man almost never goes, and where sugar, candy, flour, and molasses are unknown, I found practically no decay of the teeth. And, wherever I did find decay of the teeth, I always found that the native had eaten refined sweets in some form, no

matter how far he lived from civilization. I have, therefore, coined the following true slogan: *"An unsweetened tooth cannot decay."* So the first rule for growing perfect teeth is to teach the child *to avoid refined sweets.* Natural sweets may be supplied by eating dates, figs, raisins, fresh fruits, and many other foods that contain natural sugar. These are much safer for the teeth. And then, teach the child to clean his teeth thoroughly right after he takes either sweet or sticky food.

Announcer.—You may be very sure I'm going to look at the jam jar and the candy counter in a very different way from now on. I'm going to say to them: "You may have a very nice taste, but you are enemies to my teeth and of my body." What is the next rule for growing these perfect sets of teeth?

Dr. Waugh.—Give children foods that require rugged chewing, such as hearth-baked, crusty breads, fresh fruits and vegetables, like apples and celery, and make sure they chew them thoroughly. Practically all the food the Eskimos get is tough and it *has* to be chewed harder than any of our foods. As a result, these Eskimos have the best formed and strongest jaws of any people in the world. On one of my trips to the Arctic, I measured the biting strength of many Eskimo fathers and mothers, and some boys and girls. They are a short people, the women averaging only five feet and the men 5 feet 4 inches in height, and 127 pounds in weight. Their biting strength was two and one-third times stronger than a university squad of 108 football players who averaged 6 feet in height and 178 pounds in weight. A little girl, 8 years old, could bite harder than the strongest football player. Hard chewing strengthens the jaws, stimulates their growth in childhood, and is one of the best ways of cleansing teeth and preventing decay.

Announcer.—Dr. Waugh, I can see how this information is of the greatest value to every mother, especially if she can begin with her child in babyhood. Will you please start at the very beginning and tell the mothers who are listening just what they can do for their children's teeth at different ages?

Dr. Waugh.—Yes, indeed. It should be possible for us in this vicinity to raise the healthiest child in the world. We have advantages that no savage tribe can possibly have. All we need to do is to recognize four very important dangers and guard ourselves against them. These are: *first, refined sweets in excess; second, unclean teeth; third, eating only soft foods; fourth, avoiding the dentist.*

The *first* of these dangers has to do with food. Of course, the very wisest thing a baby can do is to select a healthy mother who can nurse and properly nourish him. Nursing by a healthy mother gives a child the best possible start in life. Nursing by a physically unfit mother may be one of the worst things that can happen to a child. The mother who cannot nurse her child or who, after she is through nursing him, will need to fall back on the bottle to nourish him fully, should have the advice of her physician as to what she should put into the bottle and the *kind of rubber nipple* she should use. The *right* kind of nipple will help develop the infant's jaws. The wrong kind of nipple will hinder their proper growth. After the child is past the bottle stage, his food should include a considerable proportion of fruits and vegetables prepared for him as the physician will direct. He will already have had a good deal of milk, and this should be continued all through his growing period. Soon after his teeth begin to show,

he will want to chew things, and tough crusts of hearth-baked bread will be very helpful. It should not be toasted. When a child gets old enough to associate with others, he may run into the candy habit. The only protection against this seems to be to teach him to like natural sweets such as dates, figs, raisins, and fresh fruits, and if it is necessary for his contentment, give him a little candy at the *close* of the meal. He should be taught to brush his teeth right after he has eaten the candy or sweet pastry. He should not eat sweets between meals. Sticky, chewy candies are most harmful.

The *second* danger is uncleanliness of the teeth. Very simple habits of cleaning, if begun early and continued, will be sufficient. A medium toothbrush, almost any good paste or powder of agreeable flavor, the habit of regular brushing, at least twice a day, together with supervision by the mother, will probably prove sufficient. Cleansing just before going to bed is the most important time as teeth tend to decay more at night.

The *third* danger for us to consider today is crowding and irregularity of the teeth. This is due to narrow and underdeveloped jaws. From the time a child is 2 years old, he should see his dentist regularly. If the front teeth are crowded and show the slightest irregularity, call the matter to the attention of your dentist who will, probably, suggest rugged chewing habits, or rubber exercisers that will stimulate growth of the jaws and help to correct the condition. By the time the child is four or five years of age, spaces should have begun to appear between the front teeth in each jaw, if the jaws are growing properly. This is the growth which is to provide space for the larger permanent teeth which will begin to appear when the child is about six or seven. If these spaces have not begun to show by the time the child is five, call the matter to the attention of your dentist. Never have two baby teeth extracted to make space for one permanent tooth. A child's baby teeth are fully as important as his second set. Begin at two years and have the dentist attend to him regularly. This is most important as baby teeth should be kept until their successors are ready to take their places but remember to have him chew tough foods.

The *fourth* danger is loss of the *permanent first molars.* When the child is about five or six, this very important tooth will appear behind the baby teeth on each side of each jaw. That is, two in the lower jaw and two in the upper. They are, as a rule, the first of the permanent set to erupt, and are the largest, strongest, and most important teeth in the mouth at any age. They may not attract your attention when they come through. In fact, they are often thought by mothers to be baby teeth. They should be watched for and kept very clean. They should be examined by the dentist within three months after they come through the gum. Do not wait until they are fully grown. If proper care is taken of them, they should last throughout life. If they are lost through decay or otherwise, it will be most difficult to grow a regular set of teeth without special and prolonged treatment. It is not difficult or expensive to give the child practically perfect teeth if we feed him properly, keep his mouth clean, have him visit his dentist regularly from the second year on, and make sure that he gets plenty of rest and builds a healthy body. But above all, remember, please, that *"an unsweetened tooth cannot decay"* and that the *chewing of tough foods during childhood serves to stimulate jaw growth which promotes straight teeth and healthy gums.*

Department of Oral Surgery and Pathology

Edited by

STERLING V. MEAD AND KURT H. THOMA

Articles on oral surgery, radiography, and anesthesia should be submitted to Dr. Sterling V. Mead, 1149 Sixteenth Street Northwest, Washington, D. C. Articles on oral pathology should be submitted to Dr. Kurt H. Thoma, 53 Bay State Road, Boston, Mass.

A LOGICAL APPROACH TO THERAPEUTICS

JEROME S. GROSBY, D.D.S., ST. LOUIS, MO.

ALTHOUGH the phrase is trite, nevertheless there is much truth in the statement, "We fail to see the forest for the trees." Likewise we often fail to see the trees because of the forest. So often the dental profession finds itself adhering to the habit of viewing the local and often relatively superficial signs and symptoms of disease and overlooking the fundamentals of pathology. This, coupled with the fact that we are so willing to take the line of least resistance by practicing that which is empirical and dogmatic, often leads us into a labyrinth of chaotic reasoning. While there is no denying that the practice of dentistry is largely an art, and as such is essentially empirical, we must still bear in mind that the foundation of the profession has its roots in science and is consequently rational in its purpose. It is sheer folly to believe that all of the practice of dentistry can be rationalized at the present time; nevertheless, it is even greater folly to divorce ourselves from those elements of reasoning which are present at our call. In other words, though practicing empirically, rationalism should be the goal. This presents no mystery and in its simplest terms is nothing more than logical reasoning from cause to effect. Many empirical remedies may be said to become rational through long usage, and by virtue of their effects. Although this is true in a sense, empiricism should always be questioned and discarded wherever rational methods may take its place. In no phase of dental or medical practice has the end-all of knowledge been reached. Let us take a lesson from the young child whose constant questioning is his method of learning. Note how many of his questions are preceded by "why." That is the birth of a curiosity that leads to understanding.

If we will only bear in mind fundamental factors, we will often find our problems greatly simplified. Let us consider some of these in an effort to determine how they affect our daily dental problems. We shall not attempt to present anything new, startling, different, or dramatic, but merely endeavor to point out that through the rational application of our present knowledge much may be accomplished.

From the Department of Periodontia, St. Louis University School of Dentistry.

Dealing with inflammatory disturbances, let us analyze the elements of this type of reaction. In the process of simple inflammation, the causative factor or stimulus produces a brief and transitory contraction of the arterioles, lasting but a few seconds. This is immediately followed by a dilation of the arteries, capillaries, and veins in the order listed. The whole presents a picture of increased vascularity with the following effects: a rapid blood current which later becomes slow until stasis is produced. This is accompanied by diapedesis of the white and red blood cells, plasma also passing through the blood vessel walls. This process continues until we find considerable fluid exudate (inflammatory edema) and finally localized leucocytosis and degeneration of blood, blood vessels, and surrounding tissue. This is largely the result of embarrassed circulation. We have mentioned the existence of fluid exudate. There are three essential reasons for this continued fluid retention: first, reduction of tissue tone and elasticity; second, thrombosis of the lymph vessels; and third, induration and edema of the regional lymph nodes. These three factors in combination cause the continuation of fluid retention characteristic of many chronic inflammatory conditions; they should be remembered whenever therapy is attempted.

Inflammation represents an increased and altered activity as the result of irritation. It is a pathologic process per se, but since its object is the removal of the irritant, it is conservative and useful, if within reasonable limits. We should, therefore, hesitate before hastily treating acute inflammation as such. Instead, we should seek and attempt removal of the cause.

There are three types of inflammation with which we are concerned in our field of oral pathology. First, the exudative; in this type there is considerable fluid present with edema and, frequently, hemorrhage. It is usually the result of an intense irritant. This type is fairly common in the mucous membrane tissues and is characteristic of a relatively acute traumatic gingivitis, or the result of chemical irritants. Second, the productive type, in which we find cell proliferation. There is some primary tissue destruction. If the irritant continues, infectious granulation tissue develops. This type of inflammation is seen in the peridental membrane disturbances such as the proliferative type of pyorrhea and granulating tooth sockets. Third, the necrotic, in which there is death of tissue. This is frequently due to the action of anaerobic bacteria upon partially devitalized tissue. There is very little exudate, but a rapid necrosis with considerable hemorrhage as a result of the sloughing of tissues exposing underlying blood vessels. There is usually a foul odor. This type is characteristically seen in the acute Vincent's infection.

Powerful irritants applied to the mucous membrane produce necrosis, rather than simple inflammation. Mild irritants disorder and stimulate but do not destroy tissue cells, thereby producing a simple inflammatory reaction. In the mucous membrane a secondary inflammation intensifies and spreads a primary inflammation, resulting in a depression of functional cell activity. In any inflammatory reaction healing cannot be expected until the defensive process exceeds the irritative. We should therefore use considerable caution before applying irritative remedies as therapeutic agents. So-called heroic and extreme measures are seldom necessary.

If we will bear in mind the foregoing fundamentals, retaining them as we would a photographic image, and apply our knowledge of their essential principles, we will find that the resultant rationalism will greatly simplify our questions and problems of therapy. In the final analysis it is primarily a close observation of the pathology present and a subsequent application of common sense. With the foregoing principles in mind, we shall review some essential facts of our materia medica and pharmacology and attempt to discern a logical connection between the two. In this manner we may, in part at least, find the answer to our question, "why." In some instances the rational chain of thought will be clear, while in others, due to inadequate knowledge of all the facts, the result will be apparently empirical. We are not attempting to destroy all of our empiricism. That would leave us with very little. There is no question of its essential part; we are merely endeavoring to supplant it by better principles when possible.

We shall now attempt to analyze the action of certain agents frequently used in the treatment of gingival diseases. One group is the astringents. They produce the following effects: first, a contraction of the arteries and arterioles (this does not take place through the contraction of the smooth muscles, as in the case of adrenalin); second, a diminishing of secretions; and third, inhibition of leucocytosis and its attendant pus formation (a defensive reaction). The first and second actions are the result of the tanning of the intercellular cement substance between the endothelial cells. This results in dense fibers of precipitated albumin blocking the normal fluid passage between cells. In this same manner astringents reduce glandular activity. This is particularly objectionable in pyogenic infections. If this group of agents is used over a long period of time, permanent cell injury may result, and for this reason if no other, the habitual use of these drugs should be discouraged.

The next group are the caustics (escharotics and cauterants). These produce protoplasm destruction. Where such is desired, they may be used if kept within limits. In all other instances their effects should always be considered. They act in the following manner: First, by abstraction of water from the cell (normal water content of cell is from 75 per cent to 90 per cent). This type of caustic is seldom used by itself. Second, by dissolution of albumin (the alkalis) this type penetrates deeply, is not self-limiting and destroys cell albumin chemically. Third, by precipitation as with oxides and salts, organic compounds such as phenol, and alcohol above 65 per cent. Fourth, by oxidation in which the albumin molecule is destroyed. Characteristic of this group is nitrous and chromic acid. Fifth, by substitution, in which the hydrogen atoms in the albumin molecule are replaced by halogen (iodine, chlorine, bromine) atoms forming the halogen acids and producing a precipitation of albumin.

Occasion frequently arises for the use of oxidizing agents. Though apparently simple and harmless in their action, several considerations must be borne in mind. Liberation of free oxygen in contact with tissues, while having a transitory antiseptic action, will also produce a breaking down of normal granulation tissue, thereby delaying healing. Once the need for oxidizing agents decreases and normal healing begins, they should be withdrawn or at least used with caution. Peroxide of hydrogen, though an ideal oxidizing agent, possesses the fault of being markedly acid and consequently irritating. This

acidity is necessary for stability of this compound. Sodium perborate liberates oxygen in solution, and, being alkaline, it does not possess the objectionable acid reaction of peroxide. In the process of hydrolysis, however, it forms sodium hydroxide, a strong base which on prolonged usage may produce sloughing of tissue and attendant reactions. Recent investigations have also shown it to be responsible for lingua chromatica filaceosa (hairy tongue). Potassium chlorate, though a satisfactory oxidizing agent, is objectionable due to its toxicity. Though not definitely proved, it is generally believed that the drug is absorbed through the mucous membrane, and continued use even in small doses may produce toxic effects. Potassium permanganate is perhaps the oxidizing agent of choice for oral medication. In dilution of 1:5,000 to 1:1,000 it may be safely used in the mouth. The chief objection to it is its discoloration of the teeth. This, however, is not permanent and may readily be removed by ordinary means of prophylaxis. It should be remembered that the action of the oxidizing agents in the mouth is largely superficial. They do not penetrate to any great depth, and are frequently limited in effect by the amount of debris present.

Another group of drugs of frequent therapeutic value is the dyes. Those most frequently used are: gentian violet, methylene blue, mallophene (Mallinckrodt), pyridium (the same marketed by Merck), acriviolet, and others. Most of these dyes have been used in genitourinary tract infections. Where used judiciously they have found a place in the treatment of oral pathology. Methylene blue and gentian violet possess a bacteriostatic action toward some of the Gram-positive organisms, particularly the staphylococci and streptococci. They are of little value in the treatment of diseases due to Gram-negative organisms (Vincent's infection). Although mallophene (pyridium) has been developed as a gonococcocidal agent, it has been of considerable value in the treatment of Vincent's gingivitis. The exact rationale of its action is unknown, but the results are fairly constant. With the exception of gentian violet, which produces a mild edema, none of the dyes mentioned have an irritating effect on oral tissues when used in proper concentration (1 to 2 per cent). The primary objection to them results from the discoloration attendant upon their usage. This, however, should not be objectionable because it is transitory, and the stain is removable.

The next group for consideration is the spirocheticidal agents. These drugs derive their rationale in the treatment of Vincent's infection, by virtue of their specificity for spirochetes. This action is used on the assumption that Vincent's infection is, partly at least, a spirocheticidal disease. Leading this list we have the arsenicals, of which neoarsphenamine holds first place. For topical application it is used in a glucose solution. It is also administered intravenously, but its value in Vincent's infection when so given is still open to question and probably not equal to the risk. Another agent frequently used is Fowler's solution, which is essentially 1 per cent arsenic trioxide in 3 per cent compound tincture of lavender. Care should be taken in its administration, particularly for home use. It is exceedingly toxic. This same caution likewise applies to the use of mercuric cyanide. Bismuth subtartrate (1 per cent in glycerin) has been recommended for the treatment of Vincent's gingivitis. At the present writing it seems to show some promise, but positive as-

sertions cannot be made. Tincture of metaphen (1:250) has also been suggested (Belding) for use in trench mouth. Its resultant effects, while generally favorable, are not reliable.

For want of a better classification there remains those agents that we may group as nonspecific antiseptics. These for the most part are: inorganic salts, tincture of iodine, Talbot's solution, ammoniacal silver nitrate, trichloracetic acid, and others of a similar nature. Depending upon their concentration these drugs fall into different classifications. We shall consider them here as antiseptics. Of these, tincture of iodine probably holds first place. The chief objection to it, however, lies in its irritating properties, which may be partially overcome by the use of an acetone glycerin solution (J. L. T. Appleton). Talbot's solution (iodine, glycerin, zinc iodide), in addition to possessing antiseptic properties, is strongly astringent and, due to the glycerin content, is markedly hydroscopic. It is exceedingly useful, particularly in chronic inflammations accompanied by edematous and hypertrophic tissue. It should be used cautiously until the patient's tolerance is determined. In all of the aforementioned drugs, particularly the iodides, a possibility of idiosyncrasy should be borne in mind. The antiseptic value of the inorganic drugs varies in proportion to the degree of ionization plus the specific action of the metallic ion. Many of these affect protein producing metallic compounds (albuminates) with precipitation of tissue albumin. The albuminate forms a dense continuous surface film which may act as a mechanical protection, thereby limiting penetration of the solution to deeper tissues. The free acid formed (if not excessive) acts as an irritant, and stimulates circulation, increasing cell activity. The bacteria present, being albuminous, are coagulated, as are the superficial cells. The liquid exudates are freed from their proteins, and being more diffusible, are easily absorbed. The astringent action of these salts contracts blood vessels, thereby lessening inflammation and making them less permeable to infection. It may be seen from the foregoing that these inorganic metallic salts possess several pharmacologic properties which are frequently conflicting. We must, therefore, know which actions predominate and with a knowledge of the pathology present they may be used rationally.

Let us consider a few instances in which these therapeutic agents run contrary to that which is compatible with an understanding of pathology. Perhaps one of the most frequent and most universal errors is the indiscriminate use of astringents. As we have just pointed out, the actions of this group are at times antagonistic to each other. In pyorrhetic conditions in which there is a marked exudate accompanied by hypertrophy and edema, the first impulse is frequently the application of an astringent agent in an attempt to limit the blood supply, thereby reducing the congestion. This seems a rational application; however, we must remember that we have infection present and it must be determined whether or not the restriction of drainage and phagocytosis is too great a price to pay for the other effects. Maintenance of drainage is one of the first surgical principles in any infection, and we should be very careful in doing anything that will react contrary to this principle. Another frequent error is the use of escharotic agents in acute Vincent's infection. Superficially it appears rational to use a cauterizing agent on an infected

ulcer surface, but we must remember the problems surrounding our work in the mouth, and the difficulty of a strict limitation of our medication. Drugs have no intelligence and will act upon any and all tissues contacted. Consequently, though we cauterize the desired area, we all too frequently discover an extensive slough developing, as a result of normal tissue being affected. This, of course, only opens new avenues for reinfection. A tissue that has been debilitated by such measures (cauterization of epithelial tissue destroys nature's first line of defense) will yield readily to invading microorganisms. Many other similar examples could be quoted but space forbids.

The above represents no attempt at a complete discussion of the subject, but rather is a reminder that at times it is more important to relearn the properties of therapeutic agents that we have than it is to be in a constant quest of something new. We must avoid the formation of habits that tend to prevent our maintenance of an open mind and lead us into the pitfall of self-complacency. A superstructure is no stronger than the weakness of its foundation. If we build well and constantly bear in mind the importance of the fundamentals of our work, and apply judgment rather than guesswork in our therapy, we may feel more assured of success.

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A REVIEW OF RECENT LITERATURE DEALING WITH TRANSIENT BACTERIEMIAS

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THE invasion of the blood stream by the bacterial incitants of various infections, particularly during the early stages of the disease, has been known for some time. Such organisms as the pneumococcus, the typhoid bacillus, and the meningococcus have been isolated respectively from the blood cultures obtained from patients suffering either with pneumonia, typhoid fever, or infectious meningitis. During the past decade observations have also shown that bacteria may enter the circulatory system immediately following surgical operations. Fortunately, in the majority of instances the clearance power of the blood is such that organisms, after a period varying from a few minutes to several hours, are no longer found in the blood stream. That transient bacteriemias may follow the extraction of teeth or occur even subsequent to the act of mastication in individuals having a marked gingival inflammation has also been reported. It is further indicated that in some instances such transient invasions of the blood stream by microorganisms may lead to such serious complications as subacute bacterial endocarditis. A discussion of this subject should, therefore, be of interest to those of us who perform operations in the oral cavity and again emphasize the importance of reducing to a minimum unnecessary trauma during such procedures.

Butler,[1] in her book, *Blood Cultures*, records the findings of Seifert on the occurrence of bacteriemia following surgical operations. He found (a) that bacteriemia was present more frequently after operations on patients who suffered with acute infections than on those in whom the infection was chronic or more than ten days old; (b) that extensive handling of tissue was prone to lead to bacteriemia; (c) that blood stream invasion occurred more frequently after infected bone operations than when the surgery was limited to soft tissue. Lehmann, again according to Butler,[1] examined the blood of 100 consecutive abortion cases following curettage and succeeded in isolating the *B. welchii* in eighteen instances. Scott[2] records the results of eighty-two positive blood cultures from patients suffering with urologic lesions. He found that fifty-one of these positive blood cultures were obtained postoperatively. In thirty-four instances the blood was found to contain organisms between five and seventy-two hours after operation, while the remaining seventeen positive cultures were obtained between seven days and four weeks after operation. Scott believes the urethra was the portal of entry in 80 per cent of his cases and cautions against the use of too much force in either irrigation or injection. Barrington and Wright[3] noted in twenty-three urethral operations on eighteen patients that a bacteriemia occurred in thirteen instances. Thirteen preoperative blood cultures obtained while the patient was under anesthesia showed no growth of bacteria.

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The authors conclude that blood stream invasion is a common occurrence after operation and is dependent in part on the number of organisms present in the urine and the degree to which the tissues are traumatized.

Butler[1] also records the findings of Bartlett and Pratt who obtained four positive blood cultures following tonsillectomy. Sixty-four patients were examined and the blood obtained two hours after operation. It is probable that if the blood specimens had been taken within five to ten minutes after the removal of the tonsils a higher number of positives would have been obtained. Fischer and Gottdenker, as reported by Butler,[1] were successful in growing bacteria from the blood of sixteen of fifty-one patients on whom tonsillectomy was performed. Southworth and Flake[4] cultured blood obtained both preoperatively and postoperatively from twenty-two patients undergoing tonsillectomy. Growth of bacteria was observed in three of the preoperative and in four of the postoperative cultures. These authors doubt whether these microorganisms can be considered other than contaminants.

The above findings indicate that transient bacteriemias do occur after operative interference. Such factors as the time the blood is withdrawn following operation, the type of media employed and whether anaerobic as well as aerobic incubation is performed are very important. It is possible that the number of positive cultures might have been higher had the different investigators used a standard technique.

BACTERIEMIA FOLLOWING TOOTH EXTRACTION

Within the last few years information has been secured which indicates that extraction of teeth also may be followed by a transient bacteriemia. Okell and Elliott[5] (who were interested in the source of the *Streptococcus viridans* found in the vegetations on the valves of the heart in cases of subacute bacterial endocarditis), suspected the oral cavity of being the site of dissemination of these organisms. They therefore examined the blood of patients from whom teeth were to be extracted in the following manner:

A. 10 c.c. of blood was removed under sterile precautions from the median basilic vein of the arm while the patient was under anesthesia prior to extraction.

B. Within five minutes after extraction another 10 c.c. of blood was collected from the arm vein.

The results obtained were:

1. A transient bacteriemia was found in eighty-four of the 138 patients examined. (The *Streptococcus viridans* was invariably present.)
2. Seventy-five per cent of the blood cultures of patients with pyorrhea were positive.
3. In ten patients where no observable gum disease was present only one positive blood culture was obtained and this was from a patient following removal of an impacted wisdom tooth.
4. Bacteria were found in twelve of the 138 specimens taken before extraction. Nine of these patients had severe pyorrhea.
5. Ten per cent of 110 cases with pyorrhea had a streptococcal bacteriemia irrespective of operative procedure.

These findings, properly controlled and by competent bacteriologists, aroused the interest of others and soon further communications were made on this subject. Round, Kirkpatrick, and Hails[6] examined the blood of ten patients both before and after chewing. First, 10 c.c. of blood was withdrawn under sterile precautions from the median basilic vein of the arm. Each of the ten patients was then given mint drops to chew for a period of ten minutes. At the expiration of this time another 10 c.c. of blood was collected from each patient. Positive blood cultures were obtained in two instances after chewing the candy. Both of these patients had pyorrhea. A *Streptococcus viridans* was found in one blood culture while from the other a *Staphylococcus aureus* was isolated. These three authors are continuing their investigations, and since both bacteria have been isolated by them quite frequently from the inflamed gum, they do not consider these bacteria to be contaminants.

Fish and MacLean[7] report positive blood cultures after multiple extraction in nine patients with pyorrhea. Marseille,[8] in an investigation of 100 teeth with granuloma attached, found that bacteriemia followed their extraction in forty-two instances. The teeth were removed under ethyl chloride. Blood in 10 c.c. amounts was collected under sterile precautions both before and within two to four minutes after extraction. Only one preoperative blood culture was positive, and this patient also had the same organism postoperatively in his blood, a nonhemolytic streptococcus. The patient died seventeen days later of sepsis. Eight of the forty-two positive blood cultures contained more than one organism. In twenty-four instances a nonhemolytic (viridans) streptococcus was isolated. Anaerobic streptococci were found in eleven instances; hemolytic streptococci in seven instances; fusiform bacilli nine times, and a *Staphylococcus aureus* once. Southworth and Flake,[4] previously mentioned as doubting the significance of the organisms isolated in their tonsillectomy cases, mention in the same report that a patient with a rheumatic heart and undergoing dental extractions was also examined. A *Streptococcus viridans* was twice isolated from blood cultures taken five minutes after extractions. Further cultures taken later were negative, as was also a preoperative blood culture.

Elliott,[9] 1939, reviews the findings of his previous work with Okell, and then reports further investigations performed to determine the least degree of dental injury necessary to obtain a bacteriemia. He found where marked gingival disease was present, rocking of the teeth was sufficient to produce an ingress of microorganisms into the blood stream. Eighty-six per cent of the blood cultures which were obtained following the rocking of twenty-one teeth in mouths with gingival disease were positive. When no detectable gum disease was apparent, a transient bacteriemia was shown to have occurred in the blood of five of the twenty blood cultures taken after rocking carious teeth (25 per cent). Rocking of teeth surrounded by deep pockets and gingival inflammation was most likely to produce transient bacteriemias. The *Streptococcus viridans* was isolated in nearly all cases. Richards[10] irritated various foci of infection and was able to show that bacteriemias followed such manipulation. When he massaged the gums and rocked teeth for ten minutes in seventeen patients he found that in three instances a bacteriemia occurred.

The writer has cultured the blood of several patients both before and after tooth extraction. In one instance the patient had an area of rarefaction about the apex of a maxillary left first premolar. No evidence of gingivitis was noted. Ten cubic centimeters of blood was removed from the arm before the injection of novacain. The tooth was extracted, and the granuloma was curetted out of the socket. Five minutes later another blood specimen was taken. The pre-extraction blood culture was negative. The postextraction blood culture showed a pure growth of *Streptococcus viridans.* The patient reported later that on arriving at her home she felt hot, weak, and nauseous. The following day she experienced pain radiating from the socket into the eye, and also vomited. The next day she was normal.

The second case was that of a man who had pyorrhea. The pre-extraction blood culture was negative. The maxillary right first molar was extracted after being deliberately rocked. The postextraction culture of the blood contained a *Streptococcus viridans.* No untoward symptoms were noted.

It is evident from these findings that invasion of the blood stream occurs quite frequently following tooth extraction, and especially when teeth are removed from individuals having pyorrhea. The findings of the above eight investigations corroborate this statement. Fortunately, these bacteriemias are transient and in the great majority of patients are of little significance.

MODE OF ENTRANCE OF BACTERIA INTO BLOOD STREAM

Fish and MacLean[7] have advanced the hypothesis that the streptococci are pumped into the lymphatics and blood vessels during the process of extraction. They maintain that the technique of extraction involves the forcing of the beaks of the forceps through necrotic, infected material present in the pyorrheal pocket. As the beaks are advanced, the hyperemic granulation tissue in the walls of the pocket becomes inoculated. Numerous capillaries of the granulation tissue are ruptured by the beaks of the forceps, thereby bringing the organisms in contact with the rents in the capillary walls. Rocking of the tooth causes, alternately, positive and negative pressure on the vessels of the periodontal membrane. These vessels (lymphatics and blood vessels) pass directly down the periodontal membrane and at the apex anastomose with those entering the pulp. As the tooth is rocked the periodontal membrane is compressed and stretched, fluid running in and out of the lymphatics and blood vessels, and thus organisms are pumped into the circulation.

LENGTH OF TIME TRANSIENT BACTERIA STAY IN BLOOD STREAM

A transient bacteriemia generally lasts from a few minutes to several hours. In an attempt to determine the duration of time that bacteria remain in the blood stream, Barrington and Wright[3] injected three rabbits with large doses of *B. coli* intravenously.

The rapidity with which such enormous numbers of bacteria are removed from the blood stream is confirmed by the recent observations of Reichel[11] of the Mayo Clinic who tested the rate of disappearance of *Staphylococcus albus* from the blood stream. He used six dogs and ninety-four rabbits in the experiment. He found that the greater the number of bacteria circulating in the blood

TIME AFTER INJECTION BLOOD REMOVED AND CULTURED	RABBIT NO. 1 INJECTED WITH 1,750 MILLION COLON BACILLI	RABBIT NO. 2 INJECTED WITH 17.5 MILLION COLON BACILLI	RABBIT NO. 3 INJECTED WITH 175,000 COLON BACILLI
5 minutes	reduced to 70,000	reduced to 480	reduced to 64
10 minutes	reduced to 3,210	reduced to 27	reduced to 0
30 minutes	reduced to 133	reduced to 2	reduced to 0
1 hour	reduced to 55	reduced to 0	reduced to 0

stream, the larger is the number rapidly removed. The great majority are removed within ten minutes. This clearance power of the blood works as well in sick as in healthy animals. He attributes the filtering out of the bacteria from the blood stream to the cells making up the reticulo-endothelial system, particularly those of the liver. Transferring his results to man, he states: "If bacteria enter after operative intervention within an infected region, a short period of time will ensue during which a positive blood culture may be expected to appear, but the positive culture will not persist unless there is a focus of infection in the vascular system itself such as endocarditis, or unless an abscess is draining into the blood or unless the blood stream is invaded by an organism which is not affected by the defensive action of the reticulo-endothelial system. Otherwise expect the blood culture to be shortly negative."

BACTERIAL ENDOCARDITIS

Bacterial endocarditis may be divided into the acute and subacute forms. The former is generally a complication of some infection such as pneumonia and, less frequently, gonorrhea. The microorganisms generally found are the hemolytic streptococcus and the pneumococcus; less frequently, the influenzae bacillus and the gonococcus. Acute bacterial endocarditis runs a brief and fatal course.

In contrast, subacute bacterial endocarditis is insidious in its onset and does not necessarily follow any particular illness. The *Streptococcus viridans* is nearly always isolated at some time in the course of the disease from the blood stream. Hadfield,[12] in his book, *Recent Advances in Pathology*, reviews the subject and states that Thayer proved that 80 per cent of his cases had previous heart lesions. Sixty-five per cent of these lesions were due to an attack of rheumatic fever, while the remaining 15 per cent were the result of congenital valvular malformations.

Grant, according to Hadfield,[12] discovered that valves injured from rheumatic fever or congenital malformation, are readily traumatized in the performance of their mechanical function. Minute blood platelet thrombi form at the sites of the traumatization. These thrombi afford a site for the colonization of the *Streptococcus viridans*. Histologically, the vegetations thus formed have been found to consist from without inward of several zones. In contact with the blood stream is the outer zone of fibrin, and immediately below it are found the colonies of streptococci. Directly beneath the bacteria is a zone of leucocytes which rests on a layer of granulations attached in turn to a fibrotic base. From time to time clumps of streptococci are torn loose from the vegetation and pass

into the circulation as emboli. While the blood becomes bactericidal to the streptococcus, yet, due probably to the protection afforded by the fibrin of the vegetation, the antibodies of the blood are unable to destroy the microorganisms.

SUBACUTE BACTERIAL ENDOCARDITIS FOLLOWING TOOTH EXTRACTION

Rushton,[13] reviewing forty cases of subacute bacterial endocarditis at Guy's Hospital, London, concluded that gross dental sepsis was present in seventeen patients and, to a lesser degree, in eleven others. Thus twenty-eight of the forty patients had some degree of dental sepsis. In five instances cultures made of extracted teeth showed the presence of streptococci, but none were found in blood specimens. Patient's blood twice agglutinated the *Streptococcus viridans* in dilutions of 1:100. Rushton[13] gives the histories of several patients. One had an attack of rheumatic fever several years previous to the extraction of four septic teeth. Three days following the extractions, the patient's temperature rose to 102.6° F. A month later the *Streptococcus viridans* was isolated from his blood, and the patient showed symptoms of subacute bacterial endocarditis. A month later the patient died.

The second case was that of a boy hospitalized for three weeks with congenital pulmonary stenosis. During this time the boy's temperature (rectal) was below 100° F. Following the extraction of one tooth it rose to 101° F. Two days later two more teeth were removed. The temperature then rose to 102 to 103° F. and remained there. Three days later the patient had hemiplegia, and a week later died. At autopsy the body showed evidence of subacute bacterial endocarditis and two cerebral embolisms. Rushton concludes that, while removal of foci from the mouth is indicated, yet in some individuals with cardial lesions such removal may be more dangerous than allowing them to remain. Further, that a careful judgment and a cautious technique may determine a successful rather than a fatal conclusion. Ryle[14] claims that in three patients in a series of twenty-three in his practice with subacute bacterial endocarditis, this condition followed extraction of teeth. He states, "So simple a procedure as a dental extraction can be a dangerous undertaking in persons with valvular abnormalities, but it also appears that retention of a tooth in an infected socket with a liability to small and repeated natural trauma carries a similar risk. A specific risk of the bad practice of wholesale dental extractions which has long been condemned by physicians is now proclaimed." Palmer and Kempf[15] recently reported four cases of subacute bacterial endocarditis following either removal of teeth or periodontal treatment. All these patients had suffered from an attack of rheumatic fever at some time in their lives. After the dental extractions or the periodontal treatment they all experienced chills, fever, night sweats, and weakness. Cultures of their blood showed the presence of the *Streptococcus viridans*. These four patients all died within six months. The authors state that the *Streptococcus viridans* is constantly present in alveolar infection and frequently enters the blood stream when these infected areas are traumatized. Palmer and Kempf conclude, "This evidence has provoked serious thought and makes the treatment of oral sepsis in the presence of a debilitating condition, particularly a cardiac lesion, a serious problem."

DISCUSSION

The above observations lead to the conclusion that transient bacteriemias do often follow the extraction of teeth. Invasion of the blood stream occurs more frequently subsequent to the removal of teeth from pyorrhetic mouths, than when carious teeth are removed from individuals with healthy gums. The *Streptococcus viridans* is the microorganism generally found in blood cultures following tooth extractions. In the majority of instances this coccus remains in the blood for a period less than several hours and often cannot be found after a period of fifteen minutes.

Clinical data indicate that patients with congenital valvular malformation or heart lesions due to rheumatic fever are susceptible to the formation of vegetations on the injured or abnormal heart valves. The *Streptococcus viridans* has been isolated from such vegetations and has also been found in the blood of practically all cases of subacute bacterial endocarditis. Thus the removal of teeth may be followed by a transient bacteriemia which transports the streptococcus to those lesions where colonization occurs. The extraction of teeth in such circumstances is indeed a serious problem.

Fortunately for the dentist such individuals are relatively few in number when contrasted with the many from whom teeth are extracted. Nevertheless, the dentist must take cognizance of this problem, and attempts must be made through investigation to limit, if possible, such transient bacteriemias following tooth extractions. Fish and MacLean mention the use of the cautery about the gum and pocket as a means of preventing this invasion of microorganisms into the blood stream. However, this work has not as yet received confirmation. Whether the use of sulfanilamide or one of its derivatives given in proper dosage before extraction will be of value also has not as yet been reported. In the meantime the dentist through obtaining a careful history of previous illness of the patient and inquiring specifically concerning possible attacks of rheumatic fever or heart involvements may obtain information of importance. When teeth must be extracted from such patients, it should be done only with the approval of the physician. Of course the ideal remedy for this situation is preventive dentistry. Through its practice the number of teeth demanding extraction should be reduced to a minimum.

SUMMARY

A review of recent literature dealing with the subject of transient bacteriemias has been made. Attention has been called to the frequency of transient blood invasions by microorganisms subsequent to tooth extractions. The possibility that such transient bacteriemias may be a factor in the production of subacute bacterial endocarditis has also been indicated.

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DIAGNOSIS AND TREATMENT OF LESIONS OF THE TEMPOROMANDIBULAR JOINT

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ALTHOUGH it differs in its anatomic details, fundamentally the structure of the temporomandibular articulation is not unlike that of other joints of the human skeletal system. Most diseases of this joint have been very little understood by either the medical or dental profession because neither, until recently, has made a comprehensive study of the physiology, symptomatology, and pathology of the articulation. The joint proper has been considered by both groups as lying outside their respective domains. No real progress was made until recent years when the two professional groups began to correlate the knowledge of factors affecting the joint. The dentist contributed information regarding local mouth conditions as etiologic factors in temporomandibular joint disorders; the physician with his understanding of general joint disease has attacked the problem from the systemic angle and has clarified the subject greatly.

Inasmuch as the temporomandibular joint is made up essentially of the same type of structures as other skeletal joints it is logical to suppose that it would suffer similar affections. This is true and accounts for a very definite group of diseases, including pyogenic conditions, atrophic, hypertrophic, traumatic and specific arthritis, fractures, malformations, dislocations, and ankylosis. On the other hand, there are certain anatomic features of the joint that predispose to a group of diseases peculiar to this joint alone. These are the internal derangements.

The temporomandibular joint is difficult to study clinically because it is situated deep to heavy muscular and bony structures that make palpation unsatisfactory. Auscultation with a stethoscope often gives valuable information in clicking and grating joints. X-rays obtained by the usual technique are invariably disappointing because of the numerous superimposed structures. In most instances they are valueless because they are not taken from a fixed position in relationship to the joint on both sides thus making comparison of the joints inaccurate. The technique of laminography or section radiography as worked out by Moore[1] and others is excellent for producing clear studies of the temporomandibular joint without confusing superimposition of other structures. This technique greatly facilitates the diagnosis of joint disorders in which bony changes take place.

The anatomy of the temporomandibular articulation is very well known by all, but a brief review of the few fundamental factors important in the consideration of its diseases might be in order. The joint is composed of the hyaline cartilage covered head of the condyle which articulates with the glenoid fossa of the temporal bone likewise lined by hyaline cartilage. The glenoid fossa is limited anteriorly by the eminentia articularis and posteriorly by the tympanic plate which forms a very thin partition between the joint and

From the Clinics of Doctors Mead, Newton, Lynch, and Dingman.

the external auditory canal. A thin concavoconvex cartilaginous disc or meniscus separates the head of the condyle from the glenoid fossa and the eminentia articularis. Thus we have a two compartment joint both compartments of which have a synovial lining. The joint is surrounded by a thin loose capsule, various ligaments, and the muscles of mastication which give it strength and support. One of the most important of these structures is the upper portion of the external pterigoid muscle which attaches to the anterior part of the meniscus and controls its forward movements. The posterior movements of the disc are passive and are dependent upon its attachment to the posterior margin of the head of the condyle. A small lobe of the parotid gland is contained in the glenoid fossa just posterior to the condyle. Suppurative conditions in the joint must be differentiated from suppurative parotitis.

The auriculotemporal nerve passes very close to the mesial side of the joint and then between the condyle and the tympanic plate to distribute over the temporal and vertex region. It also innervates the temporomandibular joint by two small branches. The chorda tympani and the tympanic artery emerge from the petrotympanic fissure at the mesial edge of the glenoid fossa in close proximity to the head of the condyle.

SUPPURATIVE LESIONS

Fortunately suppurative conditions are not frequently seen in the temporomandibular joint but when present they are of the utmost significance because of the possibility of permanent damage and ankylosis. Suppurative lesions of the adjacent ear structures with extension into the joint are frequently seen and account for loss of function in the joint. Infected compound traumas with suppuration may result in joint destruction and loss of function. Gonorrheal infection of the joint is on rare occasions seen in infants suffering from gonorrheal ophthalmitis. Gonorrheal arthritis in adults may follow acute gonorrheal urethritis and involve successive joints in an acute suppurative process. Not infrequently the temporomandibular joint is affected. According to Comroe, Collins, and Crane[2] in a large series of cases of gonorrheal urethritis the temporomandibular joint was affected in 3 per cent of the cases.

The acute exanthematous diseases of childhood including measles, scarlet fever, diphtheria, and pertussis are sometimes complicated by suppurative temporomandibular joint disease. Occasionally cases of ankylosis are seen with the history of onset following these diseases. Typhoid, pneumonia, and influenza may also result in similar pathology.

The presence of bacteria in the joint sets up an inflammatory reaction progressing through the usual phases of serous, and fibrinoserous exudate with finally suppuration and destruction of the synovial lining, cartilaginous disc, and cartilaginous covering of the bone ends. During the process of repair following this series of events ankylosis is inevitable. Spontaneous rupture and drainage in neglected cases usually take place through the tympanic plate into the external auditory canal and rarely into the pretragal area.

Exquisite pain radiating to the ear and side of the head and limitation of motion of the mandible are the cardinal symptoms. The mandible may be shifted slightly to the affected side and the patient splints the jaw in a semi-open position to avoid the pain of motion. Mastication is difficult and often

impossible. Pain on pressure over the joint and pain on passive motion are important diagnostic signs. Swelling, heat, and redness may be noted in the vicinity of the joint. The condition may easily be confused with an acute suppurative otitis or parotitis and must be differentiated.

Preventive measures are important in the consideration of treatment. Most state laws now require the instillation of silver nitrate into the eyes of the newborn. This has reduced gonorrhea neonatorum and suppurative gonorrheal infantile joint lesions to a condition of rarity. Vaccination and inoculation for exanthematous and infectious diseases are recommended as a means of reducing the incidence of complications. Middle ear infections should be treated early and should not be neglected. Fortunately, the complications of middle ear disease have been reduced to almost nil by the judicious use of sulfanilamide. This drug is also successfully used in the treatment of gonorrheal urethritis and arthritis.

When a diagnosis of suppuration of the joint has been made, incision and drainage are imperative (except in gonorrheal infection) in order to prevent further damage to the joint structures and spontaneous rupture into the middle ear or external auditory canal. Gonorrheal joints should be diagnosed and treated by aspiration. Locally moist heat and x-ray therapy may be of value. General supportive measures including a diet high in calories and vitamins, forced fluids, regulation of elimination and sedation are advisable. Sulfanilamide and blood transfusions may be necessary. Fever therapy is very beneficial in the treatment of gonorrheal arthritis. During the active inflammatory period the joint should be put at rest by splinting with a head bandage or by interdental ligation to protect the joint surfaces. After the suppuration subsides mild passive or active motion is started but this will not prevent ankylosis if the bone is denuded of its articular cartilage. If ankylosis develops, arthroplasty should follow. Reconstructive procedures should be delayed until at least six months after the subsidence of the suppuration.

Case 1.—Unilateral osseous ankylosis of the temporomandibular joint following scarlet fever. The patient, a boy, aged 10 years, complained of inability to open his mouth. The onset occurred at the age of five following scarlet fever complicated by middle ear disease. The condition came on gradually and progressed in spite of several attempts to stretch the joint under anesthesia. Examination showed nothing significant except underdevelopment of the mandible with shortening of the body and ramus on the left side. The right side of the face was flattened and the midline of the mandible was deviated to the left. The notch on the lower border just in front of the angle on the left was accentuated. The mouth could not be opened and the teeth were in a poor state of repair. X-ray showed obliteration of joint structures on the left side. The patient was operated by the chief of service who removed a section of bone about 5 mm. wide from the neck of the condyle. The immediate result was good but ankylosis recurred in four months even though jaw exercisers were used. A second operation produced similar results with recurring ankylosis.

In effect all that was done at operation was to create a fracture of the neck of the condyle which subsequently healed. It is impossible to prevent

recurrence of ankylosis following this type of operation even though jaw exercisers are used daily. The most satisfactory procedure is removal of the entire condyle and interposition of a pedicle flap of temporal muscle and fascia.

CASE 2.—Unilateral fibro-osseous ankylosis following diphtheria. The patient was a white female, aged 25 years, whose chief complaint was the inability to open her mouth for twenty years. The onset followed neglected middle ear disease as a complication of diphtheria. Examination showed the usual typical underdevelopment of the mandible, with deviation to the affected side and accentuation of the notch at the lower border just anterior to the angle of the mandible on the left. Three millimeters of motion between the anterior teeth was possible. On motion the jaw shifted still farther to the left and on palpation the right condyle moved slightly forward but no motion was apparent on the left side. X-rays showed obliteration of the joint space on the left side. Diagnosis: unilateral fibro-osseous ankylosis of left temporomandibular joint.

Arthroplasty was done and at the same operation a section of costal cartilage was inserted over the periosteum of the symphysis to give prominence to the chin. Excellent function resulted, and a good cosmetic result was obtained.

ARTHRITIS

A few years ago a noted lecturer on oral surgery made the statement that arthritis of the temporomandibular joint was rare, and, when it did occur, it was present only as a terminal stage in far advanced cases in which almost every other joint in the body was first affected. We know now that arthritis is not a rare affection of this joint, and we also know that it may first occur in the temporomandibular joint with recovery and in patients who have no subsequent involvement of other joints.

Arthritis may be classified as atrophic, hypertrophic, traumatic, and specific. Atrophic arthritis is also known as infectious or rheumatoid arthritis. Hypertrophic arthritis is sometimes called osteoarthritic or degenerative arthritis.

Atrophic Arthritis.—Atrophic, infectious, or rheumatoid arthritis is a disease of young adults but occasionally may be seen in the extremes of life. Acute atrophic arthritis sometimes develops in childhood involving multiple joints and is known as Still's disease. Still's disease results in severe deformities. When the temporomandibular joints are involved in Still's disease, ankylosis develops and as a result underdevelopment of the mandible occurs.

In the adult, the onset may be acute and dramatic or it may be very gradual. At first the joint involvement may be slight and intermittent with periods of quiescence and exacerbation. Swelling, stiffness, and deformity of the joints are noted. The proximal interphalangeal, metacarpophalangeal, and knee joints are usually the first to be affected with later involvement of any of the other joints. Occasionally the temporomandibular joint is the first to become affected with subsequent involvement of other joints. The first signs may be in the temporomandibular joint with spontaneous recovery and months or years later other joints may be involved in a second attack.

Comroe, Collins, and Crane[2] outline the pathology of atrophic arthritis as follows: (1) Swelling of the periarticular tissues; (2) thickening and proliferation of the synovial membrane with small round cell infiltrations; (3) growth of granulation tissue over the articular cartilage; (4) overproduction of synovial fluid; (5) erosion of the articular cartilage, with sometimes complete destruction; (6) atrophy of the articular bone ends; (7) erosion of the bony articular surfaces; (8) fibrous or bony union with ankylosis if the disease is unchecked.

Pain, tenderness, swelling, and stiffness in the affected joints are the first symptoms. When the temporomandibular joint is involved, there are increased heat and tenderness over the joint. Limitation of motion, difficulty in mastication and phonation are observed in severe cases. The attacks often subside spontaneously leaving no clinical evidence of disease in the joint. Other attacks leave a damaged joint and destruction of the cartilaginous meniscus and the articular surfaces. In those cases where severe intracapsular damage has occurred the more fortunate joints develop only joint noises and possibly habitual subluxations whereas those joints with more extensive damage may finally go on to ankylosis.

The diagnosis is made on the history of the onset of pain, tenderness, swelling, and stiffness in the temporomandibular joint with absence of the severe constitutional symptoms seen in acute infections and no history of trauma. The presence of arthritic changes in other joints may lead to the diagnosis. Specific and pyogenic infection, although rare, must be ruled out.

The treatment is that employed in other joints involved in atrophic arthritis. Locally, heat to the affected part, rest, gentle judicious physiotherapy, and x-ray therapy are advisable. Systemically, all measures that will increase the resistance and increase the general tone of the tissues should be employed. All possible areas of focal infection should be removed. The patient should have rest, a well-balanced diet, high in vitamins; adequate clothing; and a healthful hygienic environment free from cares and worry. The value of sera, fever therapy, drug therapy, and surgical procedures, such as sympathectomy, splenectomy, and parathyroidectomy, is questionable.

Joints damaged by a disease process of this nature are predisposed to further changes due to chronic traumatic insults. For this reason, whenever possible, abnormalities of occlusion and especially loss of vertical dimension should be corrected.

Case 3.—Unilateral osseous ankylosis of the left temporomandibular joint due to atrophic arthritis. The patient was a man, 35 years of age. At the age of 25 this patient was suddenly stricken with acute multiple arthritis and was confined to bed for six weeks. Following subsidence of the acute attack he gradually developed limitation of motion in his back, neck, arms, legs, and jaw. This was followed by ankylosis of almost every joint in the skeletal system except the knees, thumbs, right elbow, and right temporomandibular joint. He had not taken solid food for nine years. The teeth were badly decayed and periodontoclasia was severe. Arthroplasty of the left temporomandibular joint gave an excellent result. The teeth were extracted, dentures were inserted and were worn successfully.

Chronic Hypertrophic Arthritis.—Chronic hypertrophic arthritis in contradistinction to the atrophic type of arthritis is a disease of older life and is one due to the physiologic processes of wear and tear that accompany age and tissue function over a period of years. It usually affects the age period beyond 45 years but may be seen in younger individuals where chronic minute traumas are the etiologic factors. It is not attended by the systemic disturbances associated with the atrophic type.

The onset of symptoms is insidious and those most commonly noted are stiffness of one or more joints with mild joint pains, ease of fatigue on exertion, and moderate enlargement of the affected joints due to bony overgrowth at the bone ends. Limitation of joint motion and referred pains due to pressure on nerve roots may be later findings.

The hands are the first members to be involved in the majority of cases. The terminal and middle phalangeal joints are the seat of trouble and show gradual enlargement of the bone ends near the joint. These small projections of bone that form at the side of the bone ends are clinically known as Heberden's nodes.

Bony ankylosis in hypertrophic arthritis is rare, and it is then seen only in the spine. Age and chronic long-continued minute traumas are the most important etiologic factors. Comroe, Collins, and Crane[2] sum up the pathologic changes of hypertrophic arthritis as follows:

(1) Softening, erosion, and degeneration of the hyaline cartilage of the articular surface.

(2) Following degeneration of the cartilage the articular ends of bone may eventually come in contact.

(3) Elsewhere in the joint a compensatory overgrowth of cartilage usually occurs.

(4) By apposition of the ends of the articular bone these may become eburnated or highly polished; this never occurs in atrophic arthritis.

(5) At the periphery of the joint new cartilaginous or bony tissue may be formed and project from the ends of the bone (forming osteophytes). This gives rise to Heberden's nodes which are found on the terminal phalangeal joints of the fingers.

(6) The capsules and synovial membranes are comparatively normal in appearance (in most instances) in marked contrast to the appearance in atrophic arthritis.

The pathology of hypertrophic arthritis, when the temporomandibular joint is affected, is essentially the same as in other joints. The joint structures lose their prominent characteristics because of erosion of the cartilage surfaces of the condyle head and also of the glenoid fossa. This process may proceed to the point where the cartilaginous disc is completely destroyed, and there is erosion of the articular eminence. Clinically the disease has an insidious onset causing only very mild disturbances in sensation and function. The condition is sometimes seen in younger individuals as a result of repeated minute trauma brought about by malocclusion, loss of occluding posterior teeth, intracapsular fractures of the joint surfaces, or as the result of previous disease. In joints of this kind cracking and snapping sensations, grating

noises, and mild aches and pains on mastication and extremes of motion are the chief symptoms. In the most advanced cases subluxation and chronic recurrent dislocations may be seen.

From the standpoint of prognosis and treatment it is rather important to differentiate between the hypertrophic and the atrophic types of arthritis. The atrophic type is the disease of younger individuals, whereas the hypertrophic type occurs after the age of 45. The atrophic type occurs chiefly as a result of infectious processes, whereas the hypertrophic type occurs as the result of age, trauma, and metabolic disturbances. The hands are very important in helping the dentist to differentiate between the two types. Heberden's nodes occur only in the hypertrophic type. The deformity of the fingers in the atrophic type occurs as fusiform enlargements of the proximal interphalangeal joints, whereas in the hypertrophic type the deformity is seen in the terminal and middle phalangeal joints (Fig. 1). Atrophic arthritis may proceed to ankylosis; hypertrophic arthritis, almost never.

In the treatment of hypertrophic arthritis, measures as rest, avoidance of trauma to the affected joints, regulation of a well-balanced diet, physiotherapy, and removal of focal infection are indicated. In this type of arthritis no improvement may be expected from the removal of areas of focal infection because the disease is primarily not on an infectious basis. Foci should be removed, however, in order to increase the general well-being of the patient. Attention should be paid to the correction of malocclusion of the teeth and establishment of normal vertical dimension in cases where there is extensive abrasion of the natural dentition, absence of teeth, or an improperly constructed denture. Edentulous mouths should be fitted with dentures in order to prevent unnecessary trauma to the temporomandibular articulation. When internal derangements become annoying, surgical removal of the meniscus is advisable. Injections of sclerosing solutions as described by Schultz[3] may be helpful.

Traumatic Arthritis.—Traumatic arthritis is the leading cause of temporomandibular joint disorders. The trauma may be acute and severe or of the chronic intermittent subclinical variety. The acute form may be a sudden impact against the mandible with or without dislocation, intra-articular, or periarticular fractures, penetrating wounds, gunshot injuries, and injudicious forceful manipulations of the mandible during dental or nose and throat procedures. The pathology is similar in many respects to that of atrophic arthritis. It is characterized by an acute serous or serosanguineous effusion into the joint associated with periarticular inflammatory changes. In the less severe injuries resolution and recovery will take place. A moderately severe injury may cause damage to the joint capsule, supporting ligaments, and adjacent muscular structures and apparently recover. It is this joint, however, that, because of the loss of tone of its component parts, is subject to repeated subluxations and dislocations with the development of annoying grating and snapping noises. In the joint with severe damage resolution does not occur and destruction of the articular joint surfaces and the cartilaginous mensicus takes place due to hypertrophy of the synovial membranes and pannus formation with eventual ankylosis.

The sudden onset of pain, swelling over the joint, pain on motion, limitation of motion with tenderness, and the history of injury will establish the diagnosis. Roentgenograms should be taken. Although they may not aid in the diagnosis they are useful for future reference.

Treatment is conservative and consists of placing the joint at rest by use of interdental ligatures or bandages in edentulous individuals; local heat, gentle massage, x-ray therapy, and aspiration if effusion is extensive.

Fig. 1.—Atrophic arthritis. Note spindling of the proximal interphalangeal joint with ulnar deviation of the hands caused by muscle atrophy. X-ray studies do not show Heberden's nodes but do show ankylosis and loss of joint structure at the proximal interphalangeal joints.

Case 4.—Unilateral bony ankylosis of the mandible following acute trauma. The patient was a 17-year-old male. At the age of 18 months this patient fell down stairs and suffered a severe blow to the chin. This was followed by swelling over the right side of the face. A few months later the parents

noticed limitation of motion of the mandible which gradually increased to loss of motion. The mother was advised by her physician that the child would outgrow the condition and that no treatment was indicated. Several physicians were consulted but all said nothing could be done. At the time of examination severe deformity of the lower part of the face was the most prominent feature. No movement of the underdeveloped mandible was possible and the teeth were in very poor condition. The left side of the face was flat, and the midline of the symphysis was shifted to the right side. The inframandibular notch on the right was deep and prominent but very little angle could be palpated on either side. Arthroplasty of the right temporomandibular joint gave good function. An attempt to lengthen the mandible by the Blair method was not successful because of marked underdevelopment of the bone. The chin was built up by supraperiosteal costal cartilage transplants to the symphysis of the mandible (Fig. 2).

Fig. 2.—*A*, Severe deformity of the chin due to ankylosis occurring early in life. *B*, After correction by costal cartilage transplants.

Chronic traumatic arthritis is comparable in its pathologic changes to hypertrophic arthritis resulting in damage and often destruction of the articular joint surfaces and meniscus with erosion of the eminentia articularis. Clinically the joint is noisy, with mild limitation of motion and moderate discomfort on extremes of motion. Marked abrasion of the teeth, loss of posterior teeth, or improperly fitting dentures with loss of the vertical dimension is the usual causative factor. X-ray shows reduction of the joint space, shallowing of the glenoid fossa, and lack of prominence of the articular eminence.

The importance of this condition to the dentist is not from the corrective standpoint but from the preventive. The process may be prevented from occurring by the maintenance of proper vertical dimension, thereby relieving the joint of the chronic traumatic shocks incident to function. Treatment is directed toward arresting the condition and not toward a cure. Restoration of the vertical dimension by building up abraded surfaces of the teeth or construction of full or partial dentures with proper bite relationship is recommended.

Specific Arthritis.—Luetic and tuberculous infections of the temporomandibular joint are rare. Tuberculous infections invariably lead to ankylosis but the condition will not be discussed here.

Syphilitic arthritis is said to occur in from two to twenty per cent of all cases of syphilis and may mimic any form of joint disease. It does occur in the temporomandibular joint but infrequently.

Case 5.—Syphilitic arthritis of the temporomandibular joint leading to ankylosis. The patient, a male, aged 15 years, had been unable to open his mouth since childhood. The parents stated that from the age of one year the patient had had no function of the mandible: no history of injury or infection was given. Examination showed the usual deformity associated with right unilateral ankylosis. Interstitial keratitis and Hutchinson's teeth were prominent. The Wassermann reaction of the patient and both parents was positive. Luetic therapy and arthroplasty, plus plastic operation on the chin, gave an excellent cosmetic and functional result (Fig. 3).

Fig. 3.—*A*, Luetic ankylosis. *B*, Following arthroplasty and plastic correction using costal cartilage transplants.

FRACTURES

Fractures involving the joint need be mentioned briefly only to condemn the meddlesome surgical procedures advocated for correction. Open reduction of fractures of the condyle is dangerous as well as unnecessary and serves only to increase the incidence of ankylosis. In instances where the fracture is complicated by dislocation of the condyle from the glenoid fossa, it is better to use conservative measures in the treatment rather than operative procedures. If ankylosis develops later, arthroplasty will correct the deformity. Almost without exception a perfect functional result can be obtained by simple interdental ligation or fixation of the mandible with splints. The possibility of ankylosis developing later is a possibility that should be considered and explained to the patient. The occasional ankylosis that develops following conservative measures does not warrant the use of operative procedures that would result in a much greater incidence of ankylosis.

MALFORMATIONS

Congenital malformations of the temporomandibular joint are rare, and most often when they are seen, it is difficult to determine whether the deformity is congenital or acquired. One case has come to our attention in which there was complete absence of the condyle with no evidence of any pre-existing disease. This was interpreted as being a congenital abnormality.

DISLOCATIONS AND SUBLUXATIONS

Dislocation may be defined as the pathologic displacement of the articular head of the condyle beyond the normal joint limits with or without the accompanying displacement of the meniscus. Dislocations may be forward, upward, backward, medial, or lateral. The most common dislocation is the anterior type. Dislocations in the various other directions occur only in association with fractures. Dislocations may be due to sudden severe trauma to the mandible. They may be due to forceful opening of the mouth with a mouth gag during dental or nose and throat procedures, or dislocation may occur spontaneously when the mouth is opened to its widest extent during the act of coughing, yawning, and laughing. A dislocation due to severe injury usually can be reduced only under an anesthetic. The type due to opening the mouth too far, under ordinary circumstances, can be reduced without an anesthetic, but occasionally ether is necessary to get relaxation.

After a joint has once been dislocated the surrounding ligaments and muscles often fail to regain their tone and recurrent chronic dislocation may be the final outcome.

There are certain predisposing factors in dislocations, namely: a shallow glenoid fossa with a low articular eminence; previous disease in the temporomandibular joint, such as atrophic, hypertrophic, and traumatic arthritis or a loose joint capsule with ligaments of poor tone. In the acute dislocations following reduction it is advisable to place the joint at rest for a period of three to four weeks by means of interdental ligation. This will give the structures a chance to regain their tone thus avoiding future joint weakness in many cases.

Subluxation is the abnormal excursion of the articular head of the condyle and meniscus forward over the articular eminence. The movement is associated with a clicking, grating, or snapping noise as the head of the condyle slips beyond the articular eminence. The movement may occur spontaneously while the patient is talking, eating, coughing, or yawning, or when chronic and habitual it may be produced willfully and voluntarily on the part of the patient. In most cases there is no pain, swelling, or tenderness associated with it, and reduction is spontaneous and occurs immediately on closure of the jaw. Some patients complain of pain on extreme opening of the mouth. The condition at first is noticed only by the patient but in the advanced stages the accompanying noises may be very annoying to others.

Subluxation can occur only in joints with a loose capsule, weakened supporting ligaments, flattened articular eminence, or a thin damaged articular disc. It is my opinion that in many individuals there is an hereditary predisposition to dislocations and subluxations. These individuals are those with

abnormally shallow articular fossae and low articular eminences with poor general tissue tone. As has been pointed out previously in this paper, preexisting injuries and diseases may be the underlying cause, but when recurrent dislocations and subluxations occur, they may in turn aggravate the very condition responsible for them.

Nonoperative procedures are rather discouraging although interdental ligation over a period of eight weeks does at times give relief in those early cases due to a weakened capsule and supporting ligaments. General measures to increase tissue tone are important in conjunction with interdental ligation. Sclerosing solutions of various kinds injected into the joint to produce fibrosis of the periarticular tissues are generally ineffectual because of their lack of selectivity for fibrous and cartilaginous tissues. Many of the joint conditions are aggravated rather than improved by injections.

Schultz[3] advocates the injection of 0.5 c.c. of 5 per cent sodium psylliate into the joint. He states that it is selective for connective tissue and will not affect the cartilage. He reports that a firm dense fibrous capsule will result and in most cases relief from pain, clicking, subluxation, and dislocation will be noted within a few weeks.

Operative procedures have been advocated including reefing of the loosened joint capsule, reinforcement of the capsule by the downward reflection of a flap of temporal fascia, bone transplants to the articular eminence and downward displacement of the articular eminence. Buchman[4] reports successful results in several cases in which the meniscus was removed. This seems to be the best and most logical operative procedure.

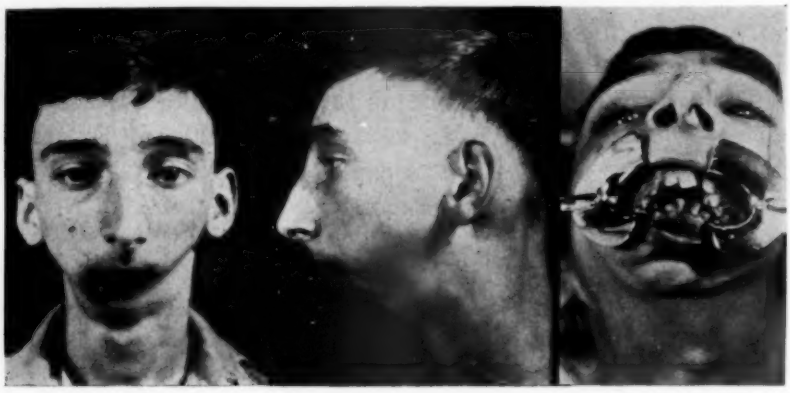
ANKYLOSIS

Ankylosis may be classified into the true or intra-articular type and the false or extrarticular type. The latter will not be discussed here as it is due to pathology outside the temporomandibular joints. True ankylosis may be fibrous, fibro-osseous, or osseous. Its occurrence has been mentioned under discussions of: septic temporomandibular joint disease, atrophic arthritis, traumatic arthritis, specific arthritis, and fractures.

Ankylosis may be unilateral or, less frequently, bilateral. When the condition occurs during the growth period there is underdevelopment resulting in deformity of the mandible. Ankylosis occurring after the growth of the mandible has been attained does not present deformities. In unilateral cases the ramus and body of the mandible on the ankylosed side are most affected. There is also underdevelopment but to lesser degree on the side where there is no joint pathology. Clinically, the ankylosed side appears to be the most normal as it is round and full. The opposite side is flat and there is deviation of the symphysis to the affected side. Motion may be slight or absent. When there is motion it will be noted most over the normal joint which will move slightly forward with deviation of the jaw toward the ankylosed side. This motion is best detected by placing a little finger in each external auditory meatus. The teeth are invariably crowded and in poor condition because of lack of proper nutrition, exercise, and care. The maxillary anterior teeth may be pushed forward and the mandibular anterior teeth pushed backward creating a small opening through which soft food may be passed (Fig. 4).

The angle of the mandible is most prominent on the affected side and the inframandibular notch is accentuated and deepened in those cases developing during the growth period. This is a constant finding and will definitely designate the ankylosed side in doubtful cases. The angle of the mandible on the uninvolved side is more obtuse and in the more severe deformities the lower border is a straight line from the symphysis to the joint with no angle present (Fig. 5).

Several different types of operation for the correction of ankylosis have been described. It is unnecessary to comment upon these except to say that all except those in which the condyle and all ankylosed bone are removed, in general, meet with failure. Various approaches to the joint have been used and most of them have commendable features but for accessibility, maximum visibility, ease of execution, margin of safety to the facial nerve and its branches, and minimum of scarring, the Blair[5] incision is most practicable. The incision starts 2½ cm. in front of the uppermost attachment of the ear and passes in a curved fashion upward and backward to a distance 1 cm. above



A. *B.* *C.*

Fig. 4.—*A*, Unilateral fibro-osseous ankylosis of the right temporomandibular joint. Note extreme flattening of the left side of the face. *B*, Note lack of prominence of the symphysis of the mandible. *C*, Note malposition of the teeth and severe stomatitis.

the free upper margin of the helix and then downward and backward on the same curve to the junction of the anterior border of the helix with the skin of the face. The incision is carried along the anterior line of the helix, posterior border of the tragus, and anterior border of the lobule. By reflecting this skin flap and underlying muscle and fascia excellent exposure to the temporomandibular joint is possible. The ankylosed tissue is removed by cutting through the base of the condyle and removing the condyle head and ankylosed bone. Often it is difficult to outline the confines of the joint or the condyle because of osseous obliteration of normal landmarks. In others the sigmoid notch may be completely filled in with bone which in turn is ankylosed to the zygoma. There is invariably increased thickness of the condyle. In some instances this may be as great as 2½ cm. from the lateral to the medial border.

The facial nerve and its branches, the internal maxillary artery and vein, the dura, and the mandibular division of the fifth nerve are structures to be avoided.

After cutting out the condyle and pathologic bone and smoothing off the exposed bone a pedicle flap of temporal muscle and fascia containing the superficial temporal artery is inserted into the space and held in position by a silk or catgut suture. A small rubber drain is inserted, and the wound is sutured in layers with silk.

At one time it was felt necessary to wedge the mouth open for several days postoperatively or to use jaw exercisers to get function. These procedures are unusually painful and annoying to the patient and in effect accomplish little. I have found in my cases that as good results were obtained by not wedging the mouth open and that within a few days the patient was using the jaw enough to give the necessary exercise for promotion of return of function.

Fig. 5.—X-ray studies of a case of unilateral ankylosis. Note the accentuation of the notch on the lower border of the mandible on the right side.

The Blair approach as described above may be used for any operative procedures on the mandibular joint.

INTERNAL DERANGEMENTS

The internal derangements have been discussed as the end results of disease in the joint under previous headings. This group of conditions is characterized by grating, cracking, and snapping sensations in the joint with or

without pain during function. The cause of the disturbances is a change in form of the articular disc, looseness of the joint capsule, bony changes, or motor disturbances of the pterygomeniscus mechanism, resulting in loss of synchronized movements of the disc and head of the condyle. Any or all of these factors may be present.

The treatment of internal derangements of the temporomandibular joint resolves itself into the removal of the cause of the condition. If the derangement is due to loss of vertical dimension of the mandible, repositioning should be done by construction of dentures, either complete or partial, or raising the bite in cases where the teeth have been abraded. If the condition is due to atrophic or hypertrophic arthritis, general treatment for these conditions is indicated. Surgical procedures may finally be necessary and probably the best of these is the removal of the meniscus. Injection of sodium psylliate may be helpful.[3]

COSTEN'S SYNDROME

In 1934 Dr. J. B. Costen,[6] an otolaryngologist, described a symptom complex which he attributed to changes in the mandibular joint incident to loss of vertical dimension due to loss of posterior teeth, abrasion of the natural dentition, malocclusion, or ill-fitting dentures. In these cases the shock of mastication is thrown entirely on the mandibular joint instead of being taken up by the occlusal surfaces of the posterior teeth. The theory was based upon a study of 167 cases. The symptoms comprising the syndrome were headache, neuralgia, burning tongue, and ear disturbances. The symptoms disappeared on establishment of normal vertical dimension and repositioning the condyle head in the glenoid fossa.

The work of Costen has stimulated considerable discussion relative to mandibular joint disease and has provoked some very productive thought and research among dentists and physicians.

The headache was described as severe and constant localized to the vertex, occiput, supraorbital region or about the ears and similar to that associated with eye and sinus disease. The explanation given for this is thinning of the bone of the glenoid fossa and impaction of the condyle head against the thin bone causing irritation to the nerves of the dura. If there is a thinning of the bone of the fossa due to erosion, might we not expect further damage even to the extent of perforation in some instances? Examination of all of the skulls with loss of the posterior teeth at the United States Army Medical Museum failed to show any with abnormal thinning or perforation of the bone of the glenoid fossa.

Dr. Aleś Hrdlîcka of the Smithsonian Institute in a personal interview made the following statement: "In our own collection of over 16,000 human skulls and in thousands of others I have examined, I have never seen one with erosion of the bone of the glenoid fossa caused by pathology in the temporomandibular joint. In many we find thickening and roughening of the bony surfaces due to hypertrophic arthritic changes. In others we find atrophic changes with sometimes loss of the entire articular head of the condyle but never any thinning of the bone of the glenoid fossa or perforation that might possibly have resulted in irritation to the sensory nerves of the dura."

Irritation of the auriculotemporal nerve by retrograde movements of the condyle head was advanced as the cause of neuralgias over the temporal region. Anatomically the auriculotemporal nerve is found close to the head of the condyle, but it is doubtful that minor retrograde mandibular movements would cause compression of it.

Costen[6] and Bleiker[7] state that injury to the chorda tympani nerve and the anterior tympanic artery by the head of the condyle in cases of decreased vertical dimension is the cause of numerous reflex and organic disturbances. Among these are otosclerotic and conductive deafness, glossodynia, glossopharyngeal neuralgia, herpetic lesions of the external ear canal, local and referred pain, and salivary disturbances, notably dryness of the mouth and occasionally excessive salivation.

The symptoms relative to the ear included in the syndrome are stuffy sensations in the ear, tinnitus, dizziness and deafness supposedly due to collapse of the eustachian tube resulting in unequal air pressure between the middle ear and the external ear. Overclosure of the jaw, according to Costen, relaxes the tensor veli palatini muscle, one end of which is attached to the cartilaginous portion of the eustachian tube. This prevents aeration of the tube during the swallowing act with resultant obliteration of the tube by tubal catarrh and subsequent loss of hearing and dizziness. The probability of tubal collapse due to overclosure of the mandible has been questioned by other investigators. Costen has been criticized by Chor[8] and Batson[9] for not using the audiometer as a measurement of improvement of hearing following treatment. Harris[10] has reported the only case in the literature that has shown improvement as measured by this method.

Diagnostic procedures in Costen's series consisted of inflation of the eustachian tubes and repositioning of the mandible by the interposition of thin cork discs between the teeth for several hours. In a surprising number of cases immediate relief from the symptoms was reported. In these individuals repositioning of the mandible by dental adjustments gave complete and permanent relief from symptoms.

Cotton rolls placed between the teeth are used by some clinicians as a quick diagnostic procedure for pains about the mouth and face. A better method is to take impressions and make accurate casts of the maxillary and mandibular teeth. Carefully mount the models in an articulator in true centric relation on an anatomic articulator with a face bow and open the bite to the estimated normal distance. Cast a metal splint to fit the mandibular teeth and fix it into position in the mouth. This splint may be worn for a few days during which time the patient can be observed for improvement of symptoms. If improvement is noted after a reasonable length of time, it is advisable to reposition the mandible and re-establish the normal vertical dimension. The position of the condyle head in the joint should be checked by careful x-ray studies.

There is no doubt that lost dimension does cause organic and reflex disturbances about the mouth, ears, face, and head and that the dental profession can do much to prevent and correct these conditions. We must not lose sight of the fact that many of the statements made regarding this subject are still

within the realm of speculation and need further scientific investigation for substantiation.

Before jumping to conclusions about a case in which Costen's syndrome is suspected, we must carefully evaluate the symptoms in the light of other symptom complexes and consider the numerous other causes of headaches, neuralgias, glossodynia, and ear disturbances. By assuming a critical attitude and proceeding in a cautious manner the dental profession may avert severe criticism that might arise as a result of misguided therapy.

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EXTRAORAL REMOVAL OF A ROOT DISPLACED BY A GUNSHOT WOUND

L. T. Russell, D.D.S., Canton, N. C.

THE patient, a man aged 46 years, was shot with a rifle (soft nose steel jacket, probably 32 cal.) approximately five years ago. The bullet entered the right side of the face in the region of the mental foramen. It shattered the mandible and distributed lead and bone fragments throughout the surrounding soft tissue.

The patient was taken to the hospital and treated by a physician. No one, including the physician, thought he had a chance to live, but he did.

From that time until several months ago the patient had had a chronic osteomyelitis of that region and a sinus tract which emptied where the bullet had entered the face. The surrounding area was slightly sore on palpation, and the patient complained of pain only when the sinus was not discharging. There was complete anesthesia of the lower lip and chin from the lateral commissure of the mouth to the midline on the affected side. The patient began to lose weight and his condition became generally rundown about a month before I examined him. The sinus was very active at this time and discharged a dirty gray fluid which was full of pus cells. There was a cervical adenopathy of the affected side, and one node became suppurative. This gland was lanced and drainage instituted.

Extraoral radiographic examination revealed five roots scattered throughout the right side of the mandible, with the surrounding bone necrotic. The gum tissue, however, gave the appearance that the patient was edentulous except for two molar teeth on that side (no roots were visible clinically). These roots were removed intraorally at the hospital under general anesthesia, and at the same time the sinus tract was curetted and cauterized.

The postoperative results were gratifying for three months, the sinus opening closed spontaneously, and pain left the area. The anesthesia of the lower lip was evidently caused by adhesions binding the mental nerve, as these adhesions were removed, and the sensation returned to the lip and chin.

Three months later the sinus became active again. Once more radiographic examination revealed a single root near the inferior border of the mandible in a horizontal position. However, on referring to the x-rays taken previously, the root was not demonstrated and the present occlusal views also failed to show the presence of any root. For this reason I could not locate the buccolingual position of the root. Therefore, I decided to remove it extraorally by resecting that portion of the lower border of the mandible in which it was contained. The operation was performed at the hospital under a general anesthetic. My technique had to be modified because I did not have access to a wheel saw.

An incision was made from the symphysis to the angle along the inferior border of the mandible. The external maxillary artery and the anterior facial

vein were ligated and divided. (Contrary to what "avascular" textbook pictures show, there is an abundance of blood vessels in that region between the skin and cervical fascia. I suppose we must have ligated at least twenty-five which were bleeding freely.)

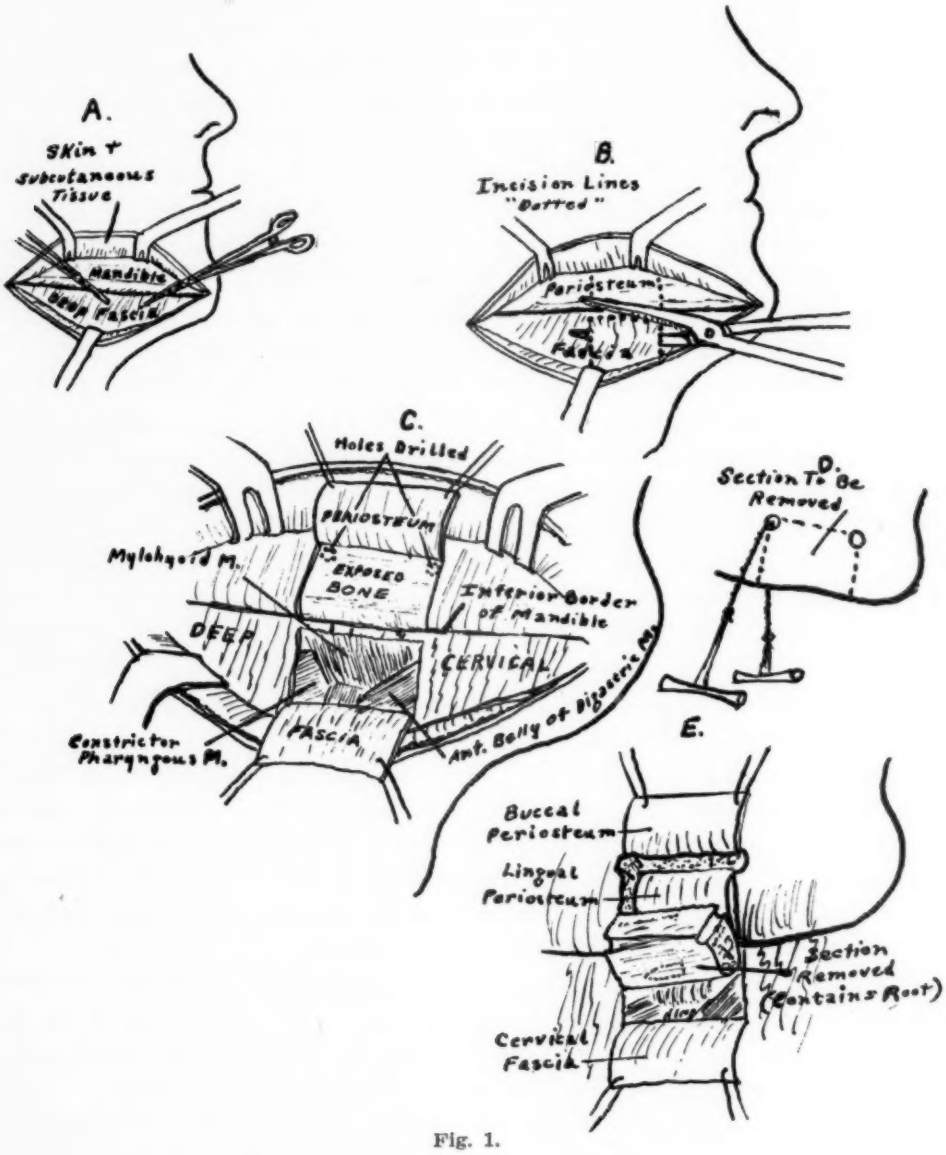

Fig. 1.

The upper part of the incision was undermined down to the fascia and retracted up about one and one-half inches. The lower part was undermined down to the great cornu of the hyoid bone and retracted. A closed hemostatic forcep was passed through the fascia in two places along the inferior border of the bone about an inch apart (Fig. 1*A*) then an open curved hemostat was passed with one beak through the anterior hole in the fascia and out through the posterior hole (*B*). The forceps were closed clamping the fascia and blood vessels within. This fascia along the inferior border of the bone, which had been clamped off, was then divided. The fascia and periosteum above were bluntly

dissected up and retracted leaving the bone exposed. The suprahyoid triangle was then dissected out as completely as possible of all lymphatic glands. Two points were located on the bone where holes were drilled through the thickness of the bone. These points were on a line parallel to the inferior border of the mandible and represented the superior corners of the rectangle of bone to be removed (*C*). The holes were made with a hand drill using a retractor underneath as a guard. Through these holes a gigli saw was introduced by a pilot suture, and the bone was sawed through to the inferior border (*D*). A few blows with the mallet and chisel separated the section of bone with the root inside. The small section of bone was still attached by the periosteum above and underneath and was rolled outward and downward to remove it leaving the periosteum attached to the lingual side of the mandible above (*E*). The surrounding bone was thoroughly curetted, and the incision was closed. The fascia below the removed section was sutured to the periosteum above, which was detached from the resected bone on the lingual. The muscle and remaining fascia were sutured, and also the subcutaneous tissue was sutured with catgut. The skin was closed with dermal suture; drainage was instituted by rubber dam through a stab wound near the hyoid bone.

The patient has made a most satisfactory and uneventful recovery. The sinus tract has completely closed, the bone and soft tissue have filled in splendidly, and the medical consultants and I think this case has reached a most happy conclusion.

Case Reports

The Editor today presents a case of gingival hyperplasia which is of great interest because it is a new oral manifestation occurring in patients who are receiving dilantin sodium for control of epileptic attacks. All contributions to this department should be sent to Dr. Kurt H. Thoma, 53 Bay State Road, Boston, Mass.

CASE REPORT NO. 37

DILANTIN HYPERPLASIA OF THE GINGIVAE

KURT H. THOMA, D.M.D., BOSTON, MASS.

SODIUM diphenyl hydantoinate, known as dilantin sodium, is a drug discovered by Merritt and Putnam (1938).[1] It is an active anticonvulsant and relatively feeble hypnotic which successfully controls epilepsy. It has certain side actions, of which gingival hypertrophy is of especial interest to us.

Pathogenesis.—The continuous use of the drug, which is taken daily by those afflicted, causes hyperplasia of the gingivae in some patients. This gingival hyperplasia is an early effect of the drug in those patients who are susceptible. Kimball (1939)[2] believed the condition to be suggestive of scurvy because he found a low ascorbic acid content in the blood of many of his patients. Merritt (1940),[3] however, feels that low ascorbic acid is not an unusual finding in clinic patients, and found that the feeding of a diet rich in ascorbic acid does not prevent or cure the gingival hyperplasia.

Clinical Findings.—The gingivae show marked overgrowth which starts with an enlargement of the interdental papillae, involving finally the entire gingival margin. The teeth become partly submerged in the hyperplastic tissue which has a firm consistency and is not particularly prone to hemorrhages.

Fig. 1 shows a typical case, not a very severe one, of dilantin hyperplasia of the gingivae in a girl aged 11 years. In addition to the gingival condition, x-ray investigation showed follicular cysts forming on both the left and right mandibular second molars (Fig. 2). This may point to an edematous condition which may influence transudation of fluid through the outer epithelial layer of the enamel organ, producing the cysts. The cysts, of course, will prevent the eruption of the teeth from which they form. Whether the cysts are coincidental in this case, or whether they are due to the action of the drug cannot be definitely determined until other similar cases have been observed. Other disturbances due to side actions of the drug include, according to the Council on Pharmacy and Chemistry (1939), dizziness, dry skin, dermatitis, rash, itching, tremors, and fever.

Histopathology.—A gingivectomy was performed on the patient mentioned above, and the cyst sacs were excised. Microscopic examination of the

Fig. 1.—Dilantin hypertrophy of the gingivae.

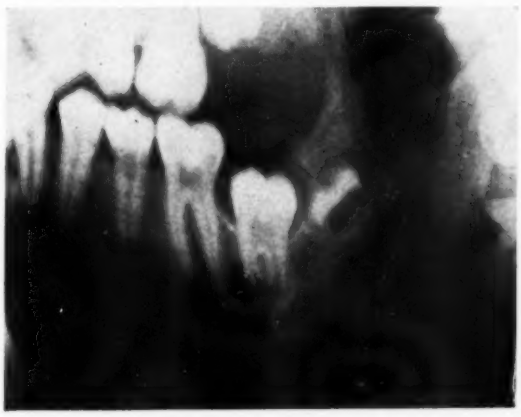

Fig. 2.—Roentgenogram showing small dentigerous cyst.

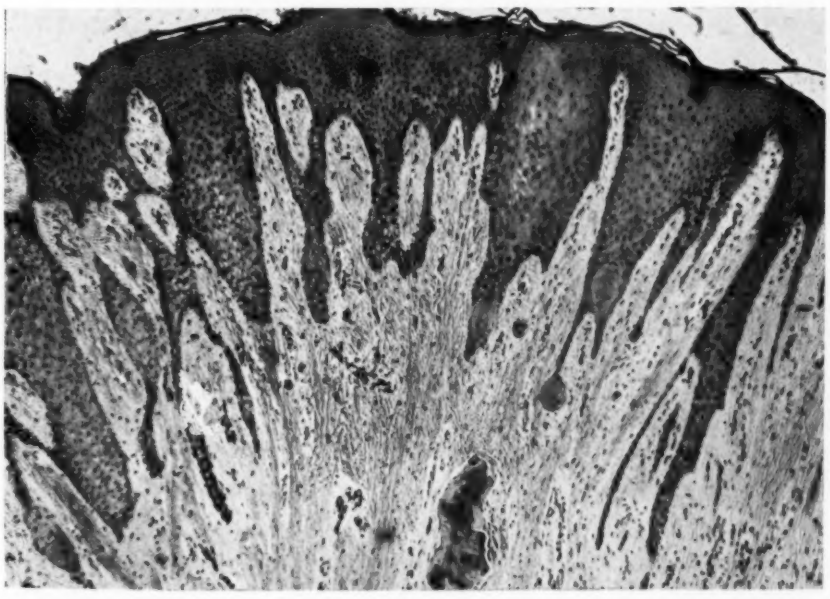

Fig. 3.—Photomicrograph of excised tissue.

gingival tissue showed acanthosis of the epithelium, which resulted in thickening and downgrowth of the epithelial rete and occasionally the formation of pearls. The corium showed edema of the papillary layer and increase in the collagen fibers of the submucosa. Increased activity of the connective tissue is evidenced by the presence of metaplastic bone (Fig. 3). In some of the specimens there was marked round-cell infiltration which was thought to be a secondary manifestation. There was no indication that this condition was due to ascorbic acid deficiency.

Treatment.—The Council recommends that the drug should not be given unless a close supervision of the patient is maintained, and it is not recommended for patients whose seizures occur only at long intervals unless moderate doses of phenobarbital are ineffective or produce disagreeable side actions. The doses of dilantin should, therefore, be guided by its side actions.

Fig. 4.—Photograph of patient six weeks after operation; showing recurrence in the interdental spaces.

In the case described it was found inadvisable to discontinue the drug because the attacks, which were well controlled by the use of three capsules a day, recurred immediately when she stopped the medication. The result of the excision of the hyperplastic gingivae, therefore, was of only temporary benefit. Six weeks after the operation there was evidence of recurrence; hypertrophied tissue was seen protruding from the interdental papillae, as illustrated in Fig. 4.

NOTE.—Three months after the operation, however, there was no great change. The granulation tissue had become epitheliated so that the gingival papillae between the first and second maxillary incisors appeared greatly enlarged. The marginal gingivae otherwise had not become greatly altered, and the crowns of the teeth had remained exposed as shown in the illustration. The patient's parents, therefore, felt that the operation resulted in satisfactory improvement.

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Department of Orthodontic Abstracts and Reviews

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Report of Two Cases of Cleido-Cranio-Facial Dysostosis: By J. M. Gulas, D.D.S., *The Journal of the Wisconsin State Dental Society* **16**: Jan.-Feb., 1940.

Cleido-cranio-facial dysostosis is a disease affecting bone growth. Many writers believe that this is an hereditary disease, transmitted as a Mendelian recessive characteristic, and can, therefore, easily be bred out in a single or two generations of cross-breeding. Some contend that it is a defect in the germ plasm, or an injury to the ovum, and is transmitted through the defective germ plasm in the form of developmental aberration in the embryo.

The most common characteristic abnormality is the bilateral or unilateral absence of the clavicle. Often only the proximal or distal segment, or occasionally the middle third of the clavicle is absent. There are also craniofacial anomalies. The cranial bones at birth are said to be widely separated at the cranial sutures, and close very slowly. Many wormian bones develop, and there is a wide longitudinal sulcus in the skull.

The parietal, temporal, and frontal eminences are unusually prominent, and, as a result, the skull has a typical cubical shape. The frontal bosses, being extended prominently, produce in the forehead a midline concavity or depression furrow. The base of the skull is often tipped anteriorward, and the foramen magnum is raised to a level with the upper part of the nose. The temporal plates are convex, and the mastoid processes are flattened.

The jaws are retarded in development; the deciduous teeth erupt very late and are retained in the jaws throughout the entire childhood and early adolescent period, and sometimes even into the third or fourth decade of life. The permanent teeth develop within the jaws, but are impeded in their eruptive movement. There are many supernumerary tooth follicles formed, with the resultant development of many supernumerary teeth and toothlike bodies, especially in the region of the maxillary central incisors or the mandibular premolar segment.

Defects in the development of scapulae have been reported several times. The terminal phalanges of the digits, especially of the thumb, are shortened, sometimes forming a noticeable shortening defect of the thumb or finger. Very often the carpal bones may show anomalies. In some, the tarsal bones are more often affected, and disclose defects especially of the os calcis and astragalus.

The disease does occur in different degrees of intensity, with varying degrees of developmental aberration. The most commonly encountered defect, at least the most often noticed one, has been defective development of the clavical, delayed eruption of the teeth, retarded development of the bones of the jaws and face, and extreme enlargement of the lateral dimensions of the skull.

Two cases are reported in two sisters both of whom showed extreme retention of the deciduous teeth. Examination of the mother, 35 years of age, revealed several permanent teeth erupting under partial dentures which were made after most of her deciduous teeth were extracted. Some of the deciduous teeth were still in the mouth.

Book Reviews

The Contribution of the Eastern Association of Graduates of the Angle School of Orthodontia to the Science and Practice of Orthodontia: Published by the Eastern Association of Graduates of the Angle School of Orthodontia, 139 pages, New York, 1939.

On May 8, 1939, the Eastern Association of Graduates of the Angle School of Orthodontia held its thirtieth annual meeting. This gathering which was convened at the American Museum of Natural History in the City of New York was the one-hundredth meeting since the Association was founded and also the last. At the time when the motion was adopted, "That we discontinue with this meeting as an active organization," the roster of the Association numbered thirty-one members and two associate members, and included most of the outstanding men in orthodontics and in dentistry, men whose respective names and contributions in the field of orthodontic research, education, and literature are known throughout the world and will be remembered as long as this specialty exists.

Milo Hellman, chairman of the Committee that planned the closing program, for once dropped the austere mantle of the impersonal scientist in which we are more accustomed to see him, when he said in the Foreword to this volume: "A band of fellows with like ideals will probably never form a closer circle and never achieve higher aims."

In addition to the list of members, officers, and minutes of the final meeting and address of the president, B. W. Weinberger, the book contains also the scientific program of the meeting. This consisted of a paper "Some Facial Features and Their Orthodontic Implications" by Milo Hellman; "Some Studies of Adaptations in Dentitions of Mammals, Including Man" by Edwin H. Colbert, and a symposium on "The Development and Progress of Orthodontia" in which the following participated: Alfred P. Rogers, John V. Mershon, Harry E. Kelsey, Walter M. Dunlap, and Frederick B. Noyes.

In his contribution on "Facial Features and Orthodontic Implications," Hellman shows the facial variability of persons with teeth in normal occlusion. It is shown that asymmetries are very slight in faces with dentitions in normal occlusion but very marked when malocclusion is present.

Dr. Colbert in his article on studies of adaptations in dentition presents an outstanding monograph on the subject.

As one reads through the various contributions dealing with the different phases of Edward H. Angle, his schools and scientific contributions, as well as the scientific contributions of the graduates of the school, one is struck with the fact that tradition need not necessarily act as a ban to progress. Here, indeed, was a group of men bound by the ties of tradition but who nevertheless were as valiant a company of trailblazers as ever graced any scientific field.

H. C. Pollock, writing editorially in the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY, at the time of the publication of the papers read before the final and closing meeting of the Eastern Association of Graduates of the Angle School of Orthodontia, in October, 1939, said: "The reading of these papers will serve to call to mind to the younger men particularly, now enjoying the practice of orthodontics, that much has been given to the specialty by those who blazed the trail of experiment, uncertainty, and who step by step created the orthodontic highway that we are pleased to travel today, from which many of the quagmires and cobblestones have been removed."

This book is a testament and testimonial of the type of men orthodontics was fortunate to attract in its early formative period.

The 1939 Year Book of Dentistry: Orthodontic Section Edited by George R. Moore, Year Book Publishers, Price $3.00, Cloth, Chicago, Ill.

Part V of the 1939 Year Book of Dentistry covers the Section on Orthodontics and as edited by George R. Moore is well subdivided into various sections in: Field in General Relationship, Growth and Development, Etiology, Appraisal of Results, etc.

As the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY is considered the leading journal in this field, it is gratifying to see the number of times that it is quoted in the annual review of literature. It is well also for us complacent Americans to read of the reports of the European orthodontists. This is a very inspiring summary of literature submitted during 1939 and should be a splendid guide for the thinking orthodontist to consult the original papers submitted. This section of the "Year Book" is not elementary in any sense and is stimulating to anyone who aspires to the calling of orthodontist.

G. S. Callaway.

Orthodontic Directory of the World: Claude R. Wood, D.D.S., Editor. O. Henry, European Editor. Price $3.00. Medical Arts Bldg., Knoxville, Tenn., Eleventh Edition, 1940.

Wood states in his introductory letter, "The question of who should and should not be listed is one of serious consequence." He gives a clue to the problem when he says, "The ultimate plan will be to recognize only university training in orthodontics of at least one year's duration."

The directory lists alphabetically cities in states in which orthodontists are located. An alphabetical listing of names is included in the index. Exclusive and non-exclusive practitioners are listed separately.

Among the useful information included in the directory is a list of the officers of the various American and European orthodontic societies and the names of the American Board of Orthodontics. The directory is attractively bound and arranged in such a manner as to make it easy to find any particular name listed.

One can easily agree with Wood that there is an inconceivable amount of detail involved in the publication of this directory. However, the job was more than well done, and Dr. Wood deserves the thanks of orthodontists and practitioners of orthodontics everywhere.

The Surgery of Injury and Plastic Repair: By Samuel Fomon, Ph.D., M.D. Formerly Major Medical Corps U. S. Army. Cloth, Price $15.00, 1,409 pages with 925 plates, Baltimore, William Wood and Co., 1939.

Traumatic surgery has rapidly increased in importance in recent years with the result that a voluminous literature covering this subject has developed. The expressed purpose of the author, to meet the needs of the general practitioner, the surgeon, the dentist, the plastic surgeon, and the oral surgeon, has resulted in an overly large volume.

The chapter on "Fluid, Salt and Acid Base Balance," although excellent per se, could easily have been omitted, if only for the sake of brevity. The parts of the book dealing with subjects of special interest; viz., plastic surgery of the nose, the mandible, and the maxilla, are presented in a clear, concise manner. The illustrations and particularly the line drawings elucidate the steps in each operative procedure and should be of great aid to all who undertake plastic surgery of the face and nose. The chapters dealing with surgery of the latter organ could, indeed, form a monograph on this subject.

Chapters XIV to XVIII, dealing with the maxillofacial region, the lips, the palate, the maxilla and mandible, and salivary glands, should prove of great value to the oral surgeon and orthodontist. Each chapter is well and thoroughly illustrated with excellent line drawings. The operative procedures are presented clearly and adequately. The value of this book is enhanced by a complete bibliography at the end of each chapter, and an excellent index.

Harry A. Salzmann, M.D.

Notes of a Countryman: By Alfred Paul Rogers. Illustrated by Francis E. Getty. Pp. 53, Price $1.75, Boston: Bruce Humphries, Inc., 1938.

Supposing one did not know personally Alfred P. Rogers of Boston whose name is synonymous with myofunctional therapy and who is immersed in the physiologic problems of dental occlusion, he would find, on reading this charming little volume, that the writer is a man of keen observation, of gentle nature who sees not only "sermons in stones" but also poems in the clouds, woods, and fields of rugged New England.

As an example of the sheer poetry of Rogers' style, we quote the following:

> The cathedral that I love the best of all is built by the Master Hand of God. It stands upon a lofty hill and points its spires to Heaven whence comes the power that fashioned it so perfectly. Its portals are always open wide; and once within the spacious nave its columned aisles are seen on either side. When one lifts his eyes tracery of flamboyant style may be seen in all the vaulted arches. The perpendicular windows let in a flood of purest light, sometimes stained blue; and often when the day is turning into night the windows on the western aisle are bright with tints no artist may hope to reproduce. The lofty dome, unlike the great St. Paul's, is painted by that Master Hand in ever changing hues so that man with eyes upturned may feed his soul, while to his ears the whispering gallery speaks in varying accents, sweet to every soul that worships here. The evening vespers whenever they are sung are in clear notes made so by Nature's special gift to songsters free from Adam's yoke.

This little book will ever remind us that "man does not live by bread alone."

Congenital Cleft Lip, Cleft Palate, and Associated Nasal Deformities: By Harold Stearns Vaughan, M.D., D.D.S., F.A.C.S., Professor of Clinical Surgery, New York Post-Graduate Medical School, Columbia University; Attending Surgeon, New York Post-Graduate Hospital; Consulting Oral Surgeon, Women's Hospital; Consulting Surgeon, Southampton Hospital; Fellow of the American Association of Oral and Plastic Surgeons. Octavo, 210 pages, illustrated with 259 engravings. Cloth, $4.00, Philadelphia, Lea and Febiger, 1940.

It was the aim of the author to produce a book of practical value to the general surgeon, the pediatric surgeon, and the specialist in plastic and reconstructive surgery. Vaughan seems to have succeeded admirably, a fact attested by the content and the numerous illustrations, photographic as well as diagrammatic, included in this volume.

Of especial interest to orthodontists will be the discussion on orthodontics in relation to cleft lip and cleft palate patients. Vaughan advises that orthodontic treatment be delayed until surgery has been completed, and the eruption of the permanent teeth has progressed to a point where treatment can be carried to completion without the interruption of waiting for other teeth to erupt. He gives the period between eight and ten years as the best average time to start orthodontic treatment.

An interesting case is cited in which the orthodontist cooperated with the surgeon during the period of surgery. The arch was narrowed by an appliance attached to the deciduous teeth. After surgical closure of the cleft, the dental arch was again expanded to conform to the occlusal relation of the mandibular teeth.

Lowrie J. Porter of New York has contributed a chapter on orthodontic appliance types and case histories. Porter advocates appliances exerting gentle pressure, and includes in his chapter many illustrations of practical cases. Prosthodontics in relation to cleft lip and cleft palate is discussed in a chapter by John J. Fitz-Gibbon, Holyoke, Mass. The book has an excellent index and adequate bibliographic reference.

Editorials

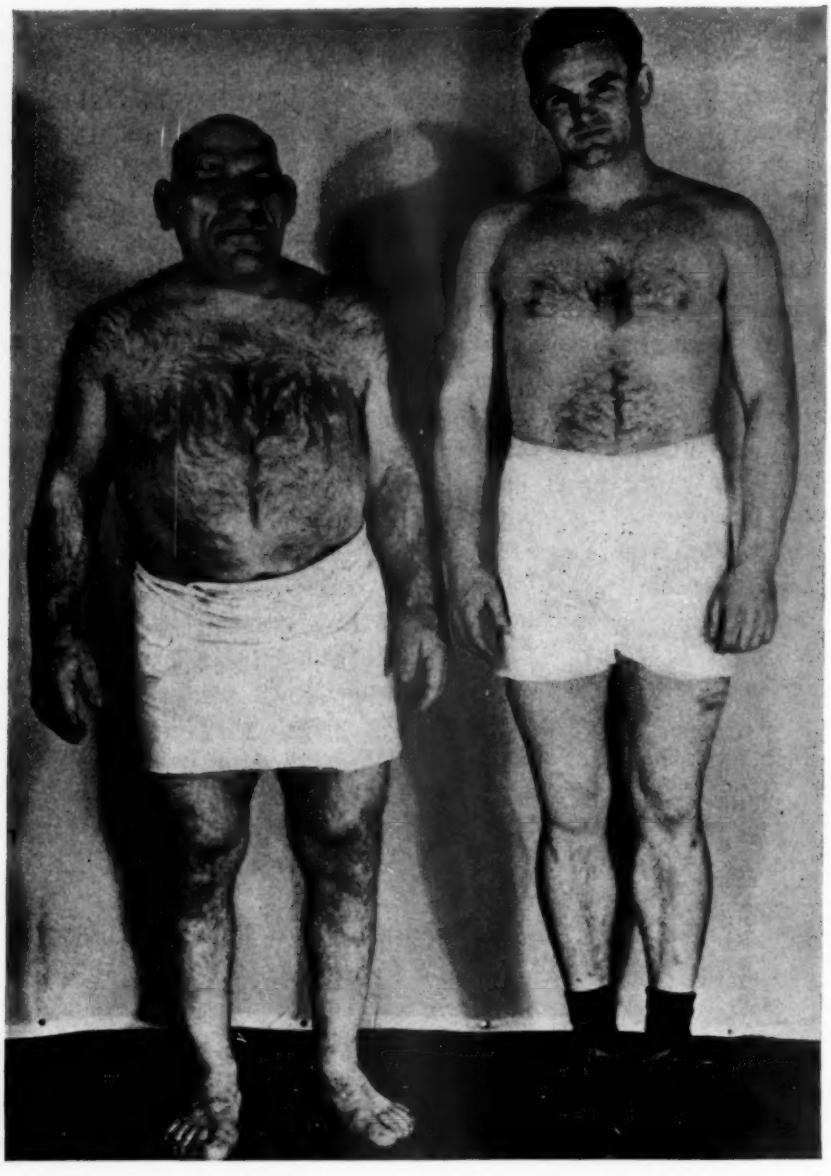
Limitations of Treatment

IF AN orthodontist or pediatrist did not promptly recognize that the individual on the left, in the accompanying photograph, is suffering from a complex glandular malady known as acromegaly, it would not be the fault of the late Englebach and Arch Elkin. Nor would it be the fault of C. C. Howard, Krogman, Sexton, and others who have appeared before orthodontic gatherings during the last ten or fifteen years to drive home the contention that malocclusion for the most part is a symptom, in many instances, of something far more complex and obscure than some habit such as thumb-sucking, pillowing, or mouth-breathing.

Orthodontists of experience, who still remain to be convinced of the great importance of the human organism as an organic constitutional whole of which the mouth, jaws, and head bones are only a small part; those who still believe that mechanical dexterity is the most important phase of the problem of successful treatment; or those who maintain a purely engineering viewpoint, should take a night off for combined recreation and observation and see that recent importation from France, one Maurice (The Angel) Tillet, the wrestler who applies his specialty, the "bear hug," with such powerful voltage that his adversaries usually succumb to defeat in a few minutes. In form and physical appearance his tremendous head, short and squat body make him seem like a throwback to an age when men lived mostly by their strength. And the Angel's strength is terrific. He carries 276 pounds on his five-foot-eight frame, a great deal of it above the shoulders. His head is probably the largest thing about him, and an orthodontist quickly notes the facial disproportion, malocclusion of the teeth, and the gigantic mandible which appears to comprise about as much osseous bulk as does the remainder of the bony anatomy of the entire skull.

When you go to see him, don't think so much about the brawn and muscle, or exhibition (that's what you pay to see), look at the lower jaw, the head, parietal bones, short legs, and tremendous torso; then in lieu of past orthodontic experience and in retrospect it is reasonable at least to wonder about the limitations of possibilities of successful treatment in the orthodontic field. Is it any wonder that even the very best of orthodontists have been perturbed over some of their stubborn cases during the first forty years of this century? You will ask yourself, "Where is the line of demarcation between malocclusion that a skillful operator can correct and one that he cannot, and who is there that knows other than by what has been ascertained by the trial and error method during the infant days of orthodontic development? Why should we expect otherwise than to fail with some cases when we reflect upon the limitations of our knowledge of the exact scientific etiology of gross facial distortions of which malocclusion is only one incident or symptom among many other incidents of major or minor importance that comprise the whole picture?"

"Would it not be a lesser task for you to throw the Angel flat on his back on the canvas for the final count of three by the referee than it would be to bring about a satisfactory correction of his malocclusion and facial deformity?" No doubt, many orthodontists of experience would answer that to defeat the Angel, as a wrestler, would not be an impossible feat for some individ-



Comparison of the osseous development of the Angel with that of a normal man of slightly lighter weight.

ual with sufficient strength, but to correct his malocclusion would be impossible, because it is undoubtedly the result of an endocrine dysfunction that may have been made inevitable at the time of fertilization by the nature of the chromosomes that determined his development. To apply mechanical devices alone to correct such a condition in the usual way would be like trying to kill

an elephant with a popgun. It takes only such an exhibition as the Angel's malocclusion to convince one of this truth.

Orthodontists instituting corrective measures are plainly beginning to realize their limitations. This is evident in the type of manuscript being published in the JOURNAL, a kind which reflects the modern and current orthodontic thought. Teachers of the future will have an advantage over teachers of the past forty years in that they will enjoy the opportunity of observing corrected cases twenty to twenty-five years subsequent to correction. This is quite important to broaden perspective, and it creates an advantage former teachers enjoyed only in exceptional circumstances.

Twenty-five years' span of observation of cases treated by various operators at least teaches one thing as nothing else can, and that is there exists an important physiopathologic relationship between the oral structure and the other organs of the body and that the mouth and teeth are a part of a transitional shifting scene throughout life either in health or disease and that the extent of the shifting varies both in velocity and bulk depending upon the individual and his biologic make-up.

The Angel gives the orthodontist a ringside view of the field of orthodontic malformations raised to their most gigantic proportions, and there is an intensely practical common sense lesson in orthodontic treatment limitation to be learned thereby. That lesson, no doubt, may be that there is a line of demarcation of malocclusion beyond which the services of an orthodontist are of little or no value whatsoever, as a corrective measure, and to venture beyond that line can mean nothing but failure.

H. C. P.

Straws in the Wind

IT IS but a failure to face the direct issue to believe that the best possible distribution of adequate medical and dental care for the people has been realized. There are many leaders in these two professions who fully realize this and who are working to find out the answer within their own organizations.

It seems entirely reasonable to assume, however, that professional men collectively are best qualified to solve this problem in the end. As time goes on and the subject is more thoroughly discussed, it becomes more and more apparent that it would be not only a mistake but also a gross injustice for government to force an intervention on the professions that would bring about "goose-step" regimentation of medicine and destroy its initiative, personal pride, and ambition.

There can be no question of doubt that professional men, as a whole, are unsympathetic with what is generally regarded as socialized medicine and the way that it is practiced in other countries. Ballots have recently been collected from over 20,000 physicians, offering the largest direct expression of medical opinion on the subject ever recorded. The poll showed that 85 per cent of the physicians of America would refuse to take part in a purely socialized medicine program. Ballots were received from members and nonmembers of the American Medical Association, and in no instance was there a significant group of

physicians who championed such a plan. Their replies revealed conclusively that doctors over the nation viewed socialized medicine as a step backward insofar as its merits to public health are concerned, and 88 per cent can see only deterioration in the quality of services available to the majority of people should the federal government adopt a wide program of socialized medicine which as yet is in the blueprint stage.

A great mistake was made in attempting enforcement of the eighteenth amendment, the Prohibition Amendment, because the public was not in sympathy with the enforcement of the law. Another great travesty can be directed at public health because professional men, as a group, are not in sympathy with the whole idea as now worked out in the general plan, and cooperation of professional men cannot be forced by law. Professional men must be in accord with any plan launched, or it will be a failure in the end result that it is destined to attain.

H. C. P.

In Memoriam

Percy Roy Ashplant

PERCY R. ASHPLANT, a beloved and charter member of the New York Society of Orthodontists, passed away Dec. 17, 1939, at his home in Newburgh, N. Y., after a long illness.

Dr. Ashplant was born in London, Ontario, Canada, and it was there he received his early education in the public schools and collegiate institute. During these years he won fame as an amateur athlete.

PERCY R. ASHPLANT

During the years 1901 and 1902 he spent most of his time studying and working in the dental office of his preceptor, Dr. Fred L. Wood of Ontario, who recognized his fine qualities and inspired him to embrace dentistry as his life profession. In the fall of 1902 he entered the Dental Department of the University of Pennsylvania (now the Thomas W. Evans Institute) at Philadelphia. He was graduated in 1905, after establishing a highly creditable record in his studies and a degree of prominence and popularity among his classmen—characteristics which have endeared him to all his associates throughout his career.

In college he was a member of the Edwin T. Darby Dental Society and the British Students' Society. During his freshman year he was initiated into the Epsilon Chapter of the Delta Sigma Delta fraternity, and in his senior year was unanimously chosen as Grand Master.

Following graduation he became associated with Dr. Henry C. Ferris in the general practice of dentistry in Brooklyn, N. Y. In March of 1906 he moved to Newburgh, N. Y., where he acquired the long-established practice of Dr. Charles F. Allen. It was here that he established a fine reputation, soon becoming recognized as one of the most prominent dentists of the Hudson River Valley. In 1907 he married Miss Olive Triscott Langridge, and the union was blessed by a daughter, Marjorie, now Mrs. George M. Smith. Both wife and daughter survive him.

Eventually his interest centered in orthodontics, and in 1920 he was graduated from the Dewey School of Orthodontia, whereupon he returned to Newburgh to practice orthodontics exclusively until the time of his death. The result of his accomplishments in this field during the past eighteen years gained for him a reputation of national prominence.

In Newburgh he was a member of St. George's Episcopal Church, the Newburgh City Club, and the Powelton Club. He was also a member of the American Dental Association, the Dental Society of the State of New York, a life member of the Ninth District Dental Society, and a member of the Orange-Sullivan Dental Study Club. He served as president of the Ninth District Dental Society in 1920-21 and was editor of the Ninth District Bulletin for several years. He was a member of the American Association of Orthodontists, the New York Society of Orthodontists, and an honorary member of the Southern Society of Orthodontists.

Known affectionately to his legion of friends as "Perc" or "Ash," his very presence would quicken the beat of the heart or inspire a smile, and his name was never spoken except in tones of friendship and affection.

So let the rest of us join in these thoughts from the one friend who can be our best spokesman, and for his life of achievement, of kindness, purpose, and good deeds, let us forever keep fresh in our minds those inspiring memories which he has left to be our heritage.

THEREFORE: since it has pleased Almighty God to take Dr. Percy R. Ashplant to his eternal rest, do his many friends mourn his loss. The New York Society of Orthodontists has lost another of its charter members, one who practiced the highest ideals both as a dentist and as an orthodontist, and established standards which have been always personally inspiring and professionally elevating.

Be it resolved.—That a copy of these resolutions be permanently recorded in our minutes, also published in the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY, and a copy be sent to his family as an expression of our sympathy for them.

Adopted by the New York Society of Orthodontists, March 11, 1940.

Harry Tennison Deane

HARRY T. DEANE was born in New York City, March 13, 1886, and died in Port Washington, Long Island, N. Y., on Dec. 28, 1939. He was the son of Dr. William C. and Sarah Ellen Deane. He received his education in New York and was graduated from the City High School. In 1906 he entered the New York College of Dental and Oral Surgery, from whence he was graduated in 1908. During his senior year he won the John I. Hart medal for the best examination in his class in practical operative dentistry. He was a member of Psi Omega dental fraternity.

Following his graduation he entered the office of his father, who from 1880 to 1921 was one of the most prominent and popular dentists practicing in New

HARRY T. DEANE

York City. Among his father's many accomplishments as a teacher and in the early days of dental organizations, he also represented the First District Dental Society on the New York State Board of Dental Examiners for fourteen years.

Harry, as he was affectionately known to his hosts of friends, never specialized exclusively in orthodontics, but it was always his first love and at times constituted the predominant portion of his practice. For several years he taught orthodontics at the New York School of Dental and Oral Surgery, under the leadership of Dr. William Carr, to whom he was deeply devoted.

He became a member of the New York Society of Orthodontists in 1923, and remained so until a few years ago when failing health forced him to relin-

quish his practice and all dental activities. Harry was a faithful and loyal attendant at the meetings of this Society. His infectious smile, words of good cheer, and buoyant personality drew friends close to him and were the symbols of the happiness which he got out of life and in return imparted to others. He was also a member of the American Dental Association, The Dental Society of the State of New York, and the First District Dental Society. He was a member of Company E, Seventh Regiment, New York Athletic Club, Port Washington Yacht Club, Knickerbocker Yacht Club, and former Rear Commodore of the Manhasset Bay Yacht Club.

WHEREAS.—In submission to the will of Almighty God who in his wisdom and mercy has taken our co-worker, Harry Tennison Deane, from his earthly suffering into the realm of eternal peace, do his many friends in the New York Society of Orthodontists miss his presence and mourn his loss. *Therefore*

Be it Resolved: That as evidence of our loss, a token of our esteem and expression of our sympathy, these resolutions be placed in the records of this Society, published in the AMERICAN JOURNAL OF ORTHODONTICS AND ORAL SURGERY, and that a copy be sent to the members of his family.

Adopted by the New York Society of Orthodontists, March 12, 1940.

News and Notes

Annual Meeting of the American Association of Orthodontists
May 13, 14, 15, 16, 1940
Chicago, Illinois

The annual meeting of the American Association of Orthodontists will be held at the Edgewater Beach Hotel, Chicago, Ill., Monday, Tuesday, Wednesday, and Thursday, May 13 to 16, 1940. Because of the central location of Chicago and the exceptional facilities afforded by the Edgewater Beach Hotel, indications now point to a record-breaking meeting.

The first day of the meeting will be devoted to a golf tournament and trap shoot. The golf tournament will be held at the Tam-O-Shanter Golf Club which is easily accessible to the Edgewater Beach Hotel. The trap shoot will be held at the Lincoln Park Gun Club. A Sports Dinner will be held at the golf club Monday night, and the entire evening will be devoted to the awarding of prizes for both the golf and shooting events and a general evening of fun and frolic.

The scientific program will begin Tuesday morning, and we call your particular attention to the fact that Tuesday morning is being given over to the presentation of the General Clinics. This is an innovation in the arrangement of our program, and we hope that it will have the effect of getting our membership to the meeting early. On Tuesday afternoon Dr. Franklin Bliss Snyder, president of Northwestern University, will open the executive session with an address of welcome. The rest of the afternoon will be given over to the presentation of a paper and case report. Because a number of important issues will be presented to the membership, it has been decided to have a business session Tuesday evening to consider these matters.

On Wednesday, the entire day will be given over to the presentation of papers and case reports. On Wednesday evening the annual banquet will be held which will be preceded by the President's reception. As usual, the banquet will be informal with music, dancing, and entertainment. The cream of the theatrical talent available in Chicago will be presented in a floor show which you cannot afford to miss. There will be no speeches at this time.

Papers and case reports will comprise the program Thursday morning, and Thursday afternoon will be devoted to Limited Attendance Clinics given by men of outstanding ability. A short business session will then conclude our meeting.

The Program Committee, headed by Dr. James A. Burrill of Chicago, has succeeded in obtaining the services of the most outstanding men in their various fields. The program is well balanced, and the entire membership is most fortunate in having the opportunity of hearing these prominent men.

A large number of dealers' exhibits have been secured, and because of the fact that these organizations in no small way contribute to the success of our meeting, we solicit your cooperation in your attendance at their booths.

For the ladies who attended the last American Association meeting held at the Edgewater Beach Hotel, we need not remind them of the marvelous entertainment provided at their last visit. For those who were not fortunate enough to be there, we want to tell you that the Ladies Entertainment Committee has arranged a highly entertaining program which you simply cannot afford to miss. A style show, theater party, and bridge luncheon are a few of the high-lights.

Because we are expecting a large attendance at this meeting, it is essential that you make your hotel reservation directly with the Edgewater Beach Hotel at your earliest convenience. The hotel management has quoted convention rates for us which are very reasonable. We are looking forward to your arrival.

WILLIAM A. MURRAY, President.

American Board of Orthodontics

A meeting of The American Board of Orthodontics will be held at the Edgewater Beach Hotel, Chicago, Ill., Saturday, May 11, 1940.

Orthodontists who desire to qualify for certificates from the board should secure the necessary application blanks from the secretary. The applications must be returned to the secretary, together with any other required credentials, prior to the date of examination. Applications filed at the time of the board meeting will have preliminary consideration, so that the applicant may be advised of the work required for his subsequent examination.

Attention is called to the following resolutions adopted by the board: Any person desiring to make application to the board for a certificate must have been in the exclusive practice of orthodontics for a period of not less than five years or an equivalent to be determined by the board and based upon the following conditions:

1. He must be an instructor in orthodontics in a school satisfactory to the board.
2. He must be the associate in the office of an orthodontist whose standing is satisfactory to the board.
3. It is to be definitely understood that any person at the time of making application for a certificate shall be in the exclusive practice of orthodontics in his own name.

For further information, address:

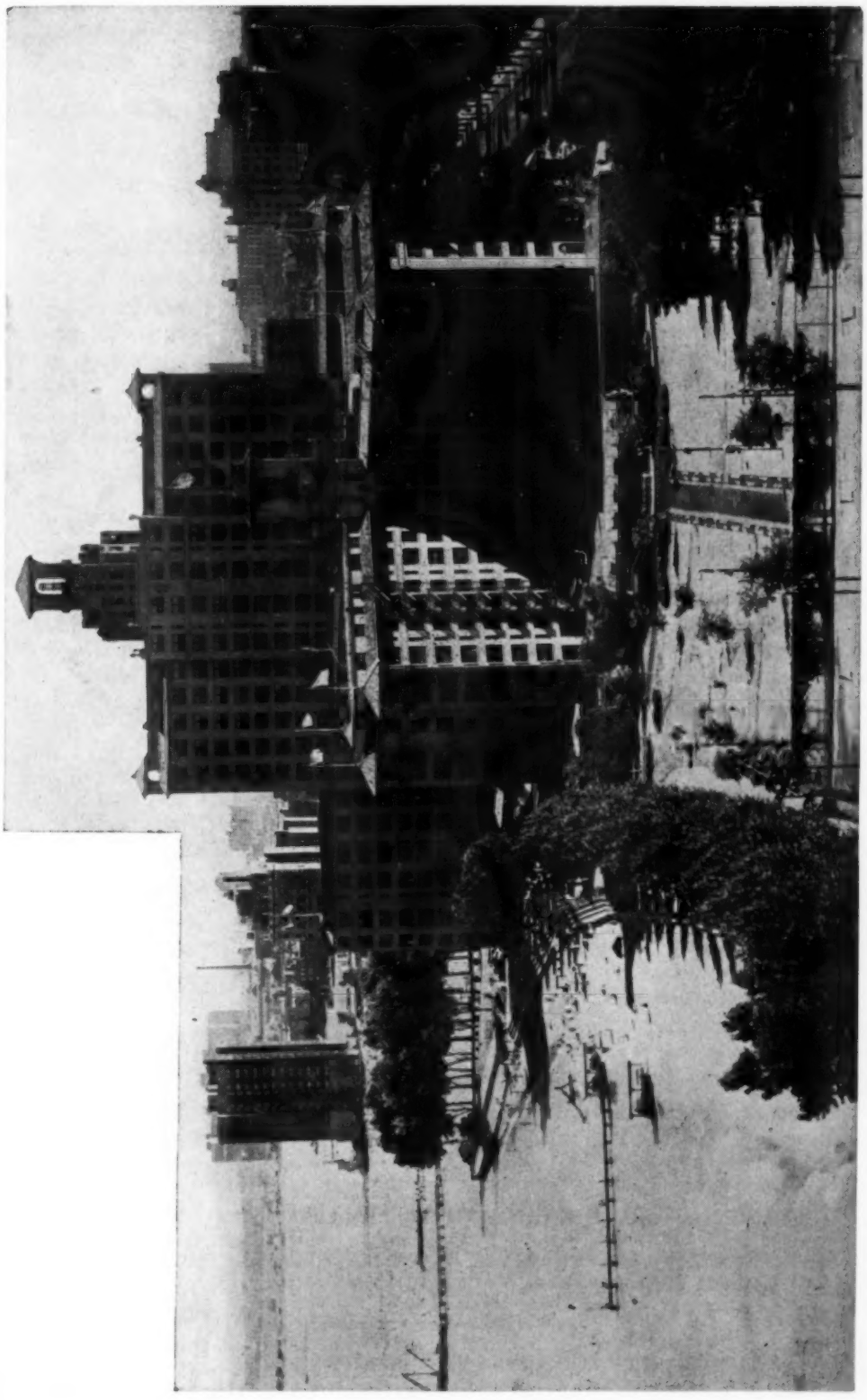
CHARLES R. BAKER, Secretary,
636 Church Street, Evanston, Ill.

Canadian and Ontario Dental Associations

The annual convention of the Canadian Dental Association and the Ontario Dental Association will be held at the Royal York Hotel, Toronto, Ont., May 27 to 29, 1940. Dentists from the United States and all parts of Canada will be welcome.

The Denver Summer Seminar for the Study of Orthodontics

The Seminar was organized in 1935-36 by a group of Denver men to promote the study of orthodontics through discussion groups. It has been continued and developed by men from Cuba, Canada, and every section of continental United States, for whom success has not dimmed the desire to learn more about the theory and practice of their profession. It was the original plan that the program be flexible so that new leaders and material could



The Edgewater Beach Hotel where the A. A. O. will hold its annual meeting May 13 to 16, 1940.

be included and that no one school or system of treatment be favored. That these aims have been achieved is shown by a partial list of Seminar discussion leaders and their subjects:

Dr. Hermann Becks—Clinical Diagnosis in Dental Medicine.
Dr. Clinton C. Howard—Growth and Its Relation to Orthodontics.
Dr. A. LeRoy Johnson—The Etiology of Malocclusion.
Dr. Gordon M. Fitzgerald—Radiography.
Dr. Allan G. Brodie—The Edgewise Arch Mechanism.
Dr. Alfred H. Washburn—Growth and Its Relation to Orthodontics.
Dr. Oren A. Oliver—Lingual-Labial Arch Technic.
Dr. R. G. Gustavson—Endocrines as a Factor in Malocclusion.
Dr. F. G. Ebaugh—Child Psychology.
Dr. Joseph E. Johnson—The Twin Arch Mechanism.

The material offered by these leaders, together with the case reports and practical experience brought by the men, has served to make each Seminar a valuable experience.

The four previous Seminars have been held in Denver, Colo., but the 1940 meeting is scheduled to be held in July at the beautiful Broadmoor Hotel, Colorado Springs, Colo. The Seminar is a nonprofit organization. Attendance is by invitation and each class is limited to thirty members who have specialized in the practice of orthodontics for not less than three years.

R. M. McDowell.

Mexican Medical-Dental Convention

At the second Medical-Dental Convention held in Mexico, D. F., Feb. 19 to 24, 1940, a part of the program was devoted to orthodontics and oral surgery. The following papers were read on these subjects:

"Orthodontic Education," Dr. Roy Dean.
"Harelip Treatment," Dr. Ralph Horn.
"Oral Surgery Simplified," Dr. Maynard Woodward.
"Orthodontic Band Technique," Dr. Ray Mac'Clinton.
"Studies of Complications in Dry Sockets," Dr. Ramon Cordova.
"Surgical Treatment of Pyorrhea," Dr. Frank Kaiser.
"Oral Pathology," Dr. Don Jose Aubertine.
"Cancer Treatment in Various Parts of the Head," Dr. George Sharp, M.D.
"Color Film in Esthetic Surgery of the Face (Plastic Surgery)," Dr. Arthur Smith.
"Instruments in Oral Surgery," Dr. E. P. Boller.
"Difficult Extraction by Dissecting Method," Dr. Frank Kaiser.
"Orthodontic Treatment," Dr. Spencer R. Atkinson.

Harvard Society of Orthodontists

The annual meeting of the Harvard Society of Orthodontists will be held at Vanderbilt Hall, Harvard Medical School, Boston, Mass., May 4, 1940.

North Atlantic Orthodontic Society

The twelfth semi-annual meeting of the North Atlantic Orthodontic Society will be held May 1, 1940, at the Hotel Pennsylvania, New York City.

Notes of Interest

A booklet has been prepared on the subject of "Orthodontics" for lay distribution by Dr. J. Bertram Stevens of Newark, N. J. The booklet is being distributed to laymen through the Essex County Medical and Essex County Dental Health Exhibit.

Dr. Lewis H. Shipman, 811 Park Building, Worcester, Mass., announces that in the future he will limit his practice to orthodontics exclusively.

Dr. Ross F. Bleiker announces the opening of his office at 333 Metropolitan Building, St. Louis, Mo., where he will limit his practice to exodontia, radiography, and oral surgery.

Dr. Edward C. Hoey announces that he has moved his offices to The Medical Group Building, 1133 Punchbowl Street, Honolulu. Practice limited to orthodontics exclusively.

Public Relations Bureau News

The Public Relations Bureau of the American Association of Orthodontists has sent out a new pamphlet, "Facts About Orthodontics for Health Workers," to the membership of the organization. It consists of twenty questions and answers—more popular information on the subject than has ever before been compiled in a short leaflet.

The copies were distributed by the committee with the following instructions:

Constituent orthodontic societies of A.A.O., or members acting on their own initiative, should bring this leaflet to the attention of persons affiliated with the following groups in their communities.

Public health field:

(a) health officers
(b) public health nurses
(c) nutritionists
(d) voluntary health associations such as National Committee for Mental Hygiene
(e) public health students
(f) nurses' training schools

Public school field:

(a) school administration authorities
(b) school physicians and nurses
(c) health teaching supervisors (who instruct the teachers how to integrate health knowledge with regular school courses)
(d) Parent-Teacher Associations and Women's Clubs
(e) child psychologists and vocational advisors

The first step recommended is to approach the local health officer, show him a copy of the leaflet, and ask him if he wishes to include it in his regular bulletin or form letter or make distribution in other ways. An offer to supply his needs free of charge will operate as a gesture which may result in the beginning of a valuable future contact.

In a similar way, approach leaders of others groups named above.

It is strongly urged that the distribution of copies be made by officers or members of these groups, *not by the local orthodontists.* Here are two good reasons: First, distribution by these groups lacks self-interest and will be more likely to produce a forcible impression; second, personal distribution or mailing to large groups from a professional man savors of advertising and may react against him in the mind of the intelligent recipient.

Remember the multiplying factor in reaching these persons with educational material. Each one is the equivalent of hundreds of ordinary citizens who may, or may not, have an interest in the subject. Members of the above groups are all *specially interested,* and, in addition, many are teachers of others. Some are teachers of teachers, and so the force of one copy to people of this type means concentration of effort where it will produce the greatest gain.

Members of groups listed above are accustomed to receive educational material of this type free of cost to them. The charge for leaflets shown on the enclosed sheet is made low to our membership in order to cover Bureau expenses in supplying them. It is expected that the local advantages to be gained by their distribution in the way described above will fully repay the small outlay necessary to offer them for free distribution.

It should be understood by every member of A.A.O. and distinctly interpreted to all contacts that the object of this work is the education, guidance, and protection of the public. This branch of dentistry becomes a health service of indispensable value when its standards are upheld.

Facts About Orthodontics for Health Workers

Q. *What is orthodontics?*

A. A division of the practice of dentistry having to do with the prevention and correction of irregularities of the teeth and deformities of the face and jaws.

Q. *Can these irregularities and deformities be prevented or corrected?*

A. Yes, in most cases.

Q. *How do such irregularities come about?*

A. Tendencies to malformation are hereditary or acquired. The acquired type may be glandular or dietary, respiratory or environmental. There may be interference with normal growth of the bones of the head and face. Diseased tonsils and adenoids often promote mouth breathing; removal of deciduous teeth too soon, or retention in position too long, also may contribute.

Q. *Are there any other contributing causes?*

A. Sucking habits and improper posture during waking or sleeping hours exert pressures interfering with normal growth.

Q. *Explain the effect of proper breathing through the nose as it relates to growth of the bones of the face and jaw.*

A. With mouth closed, as in normal breathing, muscular pressure of lips and cheeks is able to balance that of the tongue. Air traversing nasal passages creates stimulus in the direction of normal growth. With mouth open these indispensable factors to normal growth fail to function.

Q. *How does the premature loss or prolonged retention of deciduous or baby teeth affect growth?*

A. Lost too soon, adjoining teeth may shift, thus reducing the space intended for the permanent teeth. Lost too late, succeeding permanent teeth may be prevented from arranging themselves properly.

Q. *If baby teeth are lost too soon, what should be done?*

A. The space of the missing tooth should be watched and if it tends to close, a space retaining device should be attached to an adjoining tooth to keep it open.

Q. *If baby teeth are retained too long, what should be done?*

A. They should be x-rayed to determine the condition of the roots, whether the permanent teeth are coming in or not, and if present, the deciduous baby teeth should be removed. In all cases consult your dentist; he will know whether you should consult an orthodontist.

Q. *What may result from interference with proper tooth arrangement?*

A. Malocclusion—failure of the teeth to mesh properly both in repose and when chewing, producing an improper "bite," and affecting the appearance of the face.

Q. *Can malocclusion be harmful to health?*

A. Yes. When teeth are not in proper relationship to each other they do not grind and prepare food as they should before it is swallowed. This may interfere with proper digestion and throw a load on the stomach and intestines. In time these organs revolt and fail to function because of carrying a burden they were never intended to bear.

Q. *Is malocclusion a causative factor in the decay of teeth?*

A. Teeth which are not in their correct position suffer the effects of disuse or wear and tear of over-use. This prepares the way for decay and encourages the development of diseases of the gums.

Q. *Do irregular contacts between teeth have any bad effect?*

A. Decay usually results. If teeth are bunched together or overlay, cleanliness is difficult to maintain. Infection from decay is known to spread to many parts of the body,

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producing serious secondary diseases. Another avenue of disease invasion is swallowing contaminated saliva when gum infection is present.

Q. *Is personal appearance affected by malocclusion?*

A. Teeth may become too conspicuous, or jaws protrude or recede too much. If such defects become too noticeable, the result may be to produce a definite feeling of inferiority which is disturbing to personal security. The child's true personality may be distorted and the effectiveness of his adult life impaired.

Q. *At what age should orthodontic treatment be instituted?*

A. There is no fixed age in all cases. The nature and extent of the imperfection determines the time. If the child shows irregularity at any age, a consultation should be arranged. Parents should place a child under observation both for general dental care and the early detection of possible irregularities after the eruption of the baby teeth and regularly thereafter as growth continues.

Q. *Is orthodontic treatment ever indicated between the ages of 3 and 6 years?*

A. Yes. When the child's mouth shows plain evidence of interference with normal growth.

Q. *How does the orthodontist go about his work?*

A. First he makes a thorough examination of the patient as an individual and studies his history and background. He may make a plaster cast of the teeth, gums and jaws, take face measurements, and x-ray films to assist him in determining the exact nature of the abnormality.

Q. *How is treatment undertaken?*

A. No two cases are quite alike. Treatment is adapted specifically to each case, in the effort to stimulate growth in the right direction and discourage it in the wrong direction.

Q. *How is this growth stimulated?*

A. It is brought about by controlling the forces at work, which may include the solution of problems of breathing, diet, muscular habits. Systemic disorders may be suspected, which should be referred to a physician for examination. Delicate appliances which the orthodontist fits to the teeth are adjusted to the special problem. Over the course of time the results obtained are observed, and treatment is varied to conform to changes as they are brought about.

Q. *Is it actually possible to change the formation of the bony structure of the jaws?*

A. Yes, in most instances. In a few cases the maximum results cannot be realized, but most cases, taken in time, with treatment regularly continued for a sufficient period, result in marked improvement—safeguarding the health and correcting noticeable malformation.

Q. *Is this all there is to "straightening crooked teeth"?*

A. *Orthodontics concerns itself with growth. Teeth are not just forced or pried into or out of position by the exertion of mechanical pressure. If this were true one could easily make an apparatus at home and apply it to the teeth to push them in the desired direction. On the contrary, orthodontics is a highly specialized division of dentistry which requires specific knowledge of fundamental sciences, which alone makes it possible to apply corrective treatment.*

OFFICERS OF ORTHODONTIC SOCIETIES*

American Association of Orthodontists

President, William A. Murray - - - - - - - - - - - - - - - - - - Evanston, Ill.
Secretary-Treasurer, Claude R. Wood - - - - - - - - - - - - - Knoxville, Tenn.
Public Relations Bureau Director, Dwight Anderson
- - - - - - - - - - - - - - - - - - 2 East 103rd St., New York, N. Y.

Central Association of Orthodontists

President, Harold J. Noyes - - - - - - - - - - - - - - - - - St. Paul, Minn.
Secretary-Treasurer, L. B. Higley - - - - - - - - - - - - - - Iowa City, Iowa

Great Lakes Association of Orthodontists

President, Harvey G. Bean - - - - - - - - - - - - - - - - - - Toronto, Can.
Secretary-Treasurer, Richard E. Barnes - - - - - - - - - - - - Cleveland, Ohio

Harvard Society of Orthodontists

President, I. D. Davis - - - - - - - - - - - - - - - - - - - Boston, Mass.
Secretary-Treasurer, Edward I. Silver - - - - - - - - - - - - - Boston, Mass.

New York Society of Orthodontists

President, Glenn F. Young - - - - - - - - - - - - - - - - - New York, N. Y.
Secretary-Treasurer, William C. Keller - - - - - - - - - - - - New York, N. Y.

Pacific Coast Society of Orthodontists

President, Will G. Sheffer - - - - - - - - - - - - - - - - - San Jose, Calif.
Secretary-Treasurer, Earl F. Lussier - - - - - - - - - - - - San Francisco, Calif.

Rocky Mountain Society of Orthodontists

President, Leonard T. Walsh - - - - - - - - - - - - - - - - - Pueblo, Colo.
Secretary-Treasurer, George Siersma - - - - - - - - - - - - - Denver, Colo.

Southern Society of Orthodontists

President, A. C. Broussard - - - - - - - - - - - - - - - - - New Orleans, La.
Secretary-Treasurer, T. C. Sparks - - - - - - - - - - - - - - Columbia, S. C.

Southwestern Society of Orthodontists

President, G. C. Turner - - - - - - - - - - - - - - - - - - Lubbock, Texas
Secretary-Treasurer, R. E. Olson - - - - - - - - - - - - - - - Wichita, Kan.

Washington-Baltimore Society of Orthodontists

President, B. E. Erikson - - - - - - - - - - - - - - - - - - Washington, D. C.
Secretary-Treasurer, Stephen C. Hopkins - - - - - - - - - - - Washington, D. C.

American Board of Orthodontics

President, Harry E. Kelsey - - - - - - - - - - - - - - - - - Baltimore, Md.
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Treasurer, Bernard G. DeVries - - - - - - - - - - - - - - - Minneapolis, Minn.
William E. Flesher - - - - - - - - - - - - - - - Oklahoma City, Okla.
Frederic T. Murlless, Jr. - - - - - - - - - - - - - - - - - Hartford, Conn.
Oliver W. White - Detroit, Mich.
James D. McCoy - - - - - - - - - - - - - - - - - - - Los Angeles, Calif.

Foreign Societies†

British Society for the Study of Orthodontics

President, S. A. Riddett
Secretary, R. Cutler
Treasurer, H. R. Evans

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*The Journal will make changes or additions to the above list when notified by the secretary-treasurer of the various societies. In the event societies desire more complete publication of the names of officers, this will be done upon receipt of the names from the secretary-treasurer.

†The Journal will publish the names of the president and secretary-treasurer of foreign orthodontic societies if the information is sent direct to the editor, 8022 Forsythe, St. Louis, Mo., U. S. A.

GEORGE B. WINTER